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David STRUTT et al.

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For: DATA WAREHOUSE MODEL AND METHODOLOGY

Group Art Unit: 2164

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Assistant Commissioner for Patents
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Sir:

SUBMISSION OF CERTIFIED COPIES OF FOREIGN PRIORITY DOCUMENTS AND REQUEST FOR CORRECTED FILING RECEIPT

Pursuant to 35 U.S.C. § 119(b), Applicants filed a claim for priority to two foreign patent documents: Canadian Patent Application Nos. 2,339,063 and 2,349,277, filed March 1, 2001 and May 31, 2001. In support of this claim, Applicants hereby submit a certified copy of each of these foreign patent documents as specified in 35 U.S.C. § 119(b)(3). Accordingly, Applicants request that these documents be associated with this file and that the Official Filing Receipt be corrected to note this foreign priority data.

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Respectfully submitted,

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This is to certify that the documents attached hereto and identified below are true copies of the documents on file in the Patent Office.

Specification and Drawings as originally filed with Application for Patent Serial No: **2,349,277**, on May 31, 2001, by **COGNOS INCORPORATED**, assignee of Thomas Fazal, David Strutt and Robert Gibb, for "System, Model and Method for Business Performance Management".

CERTIFIED COPY OF
PRIORITY DOCUMENT

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ABSTRACT

Most organizations lack the time and resources to build their own integrated warehouse solutions from scratch. A business performance management system provides enterprise-wide business intelligence out of the box, and provides end-to-end integrated data warehousing, business performance analytics and reporting in one comprehensive package.

System, Model and Method for Business Performance Management

FIELD OF THE INVENTION

This invention relates to a system and method for business performance management, and more particularly to a system and method for business performance management to assist making business and organizational decisions.

BACKGROUND OF THE INVENTION

The hyper-competitive e-business economy has redefined relationships between companies and their customers, suppliers, and partners. With competitors but a click away, long-cultivated customer loyalty can evaporate in a keystroke. Pronounced focus on speed to market and cost containment has transformed suppliers from removed third parties into integral corporate allies.

Successfully managing customer and supplier relationships in this digitally driven environment involves successfully managing two-way information flows. Organizations—both dot-coms and brick-and-mortar enterprises—have responded by redefining processes and harnessing speed and information, the pass codes to e-business competitive advantage.

These organizations realize that their futures involve extracting important information from the mounting sources of data around them and then leveraging this information to make better and faster business decisions. Coming to grips with the analysis and reporting limitations of their enterprise resource planning (ERP) systems is an important part of this process, and many organizations are building data warehouses and data marts to optimize data to deliver the business insight they require to compete.

Most large organizations use ERP systems to consolidate day-to-day transaction data and streamline business functions such as manufacturing. With their predefined, standard reporting capabilities, however, these ERP systems are not optimized to support the flexible,

ad hoc business analysis and reporting businesses need today to make strategic decisions and improve business performance. Furthermore, ERP systems are not intended to serve as e-business analysis and reporting infrastructures.

For example, generating a report from an ERP system that shows product line sales by region by sales person for the past five years would typically be quite time-consuming. With their multitude of tables, fields, and column names, ERP systems are not well suited to end-user navigation. Without easy information access, and the means to quickly analyze and report on findings, users can overlook important business correlations or veer off-track completely. Ultimately, the quality and speed of decision-making suffer.

In addition, if hundreds or thousands of users were to submit queries directly, ERP system performance would be impacted, jeopardizing important production system functions. This, along with the risks associated with giving the extended e-business enterprise direct access to ERP systems, necessitates placing ERP data into an environment that is not only optimized for business analysis and reporting, but also for secure broad access. Seeking predictable performance and desiring to give users all the information they need quickly, many companies opt to build either data warehouses or data marts.

Companies which have strived to develop decision support systems that would support rich analysis and reporting quickly realized that operational reporting systems (e.g., ERP systems) were limited in scope and the depth of insight they delivered. While optimized for consolidating day-to-day transaction data and streamlining key business functions; these systems offer but a fraction of the reporting and analysis capabilities users need to fully comprehend what drives business performance.

Many companies turned to developing data warehouses to fill the requirement for consolidating data from across the organization, with a single consistent historical view, and designed for optimized reporting and analysis.

The ultimate objective of these systems was to ensure that the data needed to answer the relevant business questions was captured and in a form that would support timely

information for decision-making. While the intent was sound, the challenges of bringing together business and IT to define best practices from both a business and technical standpoint presented challenges. As a result projects failed resulting in decision makers being left without crucial information.

Enterprise Data Warehouses—The "Big Bang" Approach

Created by extracting data from operational or transactional systems (like ERP sources) and e-commerce systems and installing it in a more analysis- and reporting-friendly database, data warehouses are repositories of data that support management decision-making.

However, data warehouses are expensive to build and they can take 18 to 24 months to create—an eternity in Internet time. Consequently, with enterprise information requirements evolving so fast today, data warehouses often fail to meet requirements when they are finally completed. Moreover, they require specialized skills and experience to build successfully.

Because of their sheer scope, data warehouses seldom produce the finely tuned analysis and reporting that e-business decision-making depends upon. Intended to be all things to all people, these warehouses focus on breadth of content, rather than the depth of vital information sweet spots users need.

Data Marts—The Stovepipe Approach

Unlike data warehouses that combine and make all corporate data available across an enterprise, data marts focus more narrowly, serving specific business areas or departments. Data marts also take less time and money to build and can therefore generate quicker payback than data warehouses.

Sound in principle, data mart creation can stumble in practice. While data marts can be built incrementally, they do not provide a holistic view of the enterprise. Companies will build a data mart for Sales, another for Inventory, another for Finance, and so on. Unless these marts are coordinated, they act as stovepipes and prevent users from sharing information across the enterprise. They also duplicate data and lead to lengthy updates

because each mart must be refreshed individually. If companies update the marts at different times—even just a couple of hours apart—some users will have more current information than others. This lack of synchronization can lead to inconsistent analysis across the enterprise and cause users to question the integrity of the analysis and reporting solution.

For instance, users of one mart might define a "large" customer as one that generates more than $50,000 in revenue a month. Users of another might define a large customer as one that orders more than 100 units a month, which may only represent $10,000. In these cases, people can mistakenly think that they are discussing common ground. Not only may different marts define dimensions differently, they can calculate measures differently as well. For example, one department might compute "profit" by including bad debts and another may exclude them.

These types of inconsistencies not only create misunderstandings, they can delay schedules and increase costs, jeopardizing customer satisfaction and profits. There is a need for affordable business performance measurement technology, which an enterprise can use to achieve and maintain a 360-degree view of its operational and financial effectiveness, customer relationships, and supply-side activities.

SUMMARY OF THE INVENTION

The present invention uses an enterprise-wide business performance management system that gives users both the perspectives that traditional data warehouses offer and the incremental development that data marts provide. It enables users to address the business analysis and reporting needs of various functional areas or groups of their organizations, such as Sales, Finance, Inventory, Procurement, Accounts Payable, Accounts Receivable, General Ledger, etc., while integrating and coordinating these groups by using shared dimensions.

In accordance with another aspect of the invention, there is provided a business performance management model for providing backbone for business performance management for an organization having a plurality of functions, the business performance management model comprising a set of functional areas of analysis, each functional area corresponding to a group of functions of the organization, and having one or more elements for representing the corresponding functions; a set of dimensions qualitatively describing elements of the functional areas; and relation indications indicating interrelation among the functional areas and the dimensions.

In accordance with an aspect of the invention, there is provided a method for creating a business performance management model for providing backbone for business performance management for an organization having a plurality of functions, the method comprising steps of analysing functions of multiple organizations; identifying a set of functional areas of analysis which are useful to analyse business performance of the organizations, each functional area having one or more elements for representing the corresponding functions; identifying a set of dimensions qualitatively describing elements of the functional areas; and providing interrelation among the functional areas and the dimensions.

In accordance with another aspect of the invention, there is provided a data model for representing an organization having a plurality of groups of functions, the data model comprising a plurality of preset groups of tables, each group of tables representing each group of functions; and preset joins connecting the tables indicating interrelation of the tables to represent the relationship among the functions.

In accordance with another aspect of the invention, there is provided a method for creating a data model for representing an organization having a plurality of groups of functions, the method comprising steps of obtaining attributes of the functions from the organization by presenting a predetermined set of questions; analysing the attributes of the functions; and creating a data model based on the analysis.

In accordance with another aspect of the invention, there is provided a method for analysing an organization having a plurality of groups of functions, the method comprising steps of preparing a data model representing interrelation of the groups of functions; and obtaining information from the data model using the interrelation among the groups of functions.

In accordance with another aspect of the invention, there is provided a business performance management application for managing business performance of an organization having a plurality of functions, the business performance management application comprising a predefined data model representing the functions of the organization; extracting means for extracting and mapping source data into the data model; reporting means for providing reports on data stored in the data model; and an operational framework for providing control of the operation of the data mode, the extracting means and the reporting means.

In accordance with another aspect of the invention, there is provided a console for managing a data model for representing an organization having a plurality of groups of functions, the console comprising means for installing a predefined data model; and means for setting a sequence of extraction of information from each function to load the data model.

In accordance with another aspect of the invention, there is provided a method for creating a report for use by an organization having a plurality of groups of functions, the method comprising steps of accessing a data model representing interrelation of the functions; obtaining information from the data model; and compiling a report based on the obtained information.

BRIEF DESCRIPTIONS OF THE DRAWINGS

Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a diagram showing an overview of an example of a Business Performance Management System;

Figure 2 is a diagram showing the structure of an example of a Business Performance Management Model;

Figure 3 is a diagram showing an example of a Business Performance Management Foundation;

Figure 4 is a diagram showing an example of Business Performance Management for Supply-Side Performance Management;

Figure 5 is a diagram showing an example of Business Performance Management for Demand-Side Performance Management;

Figure 6 is a diagram showing an example of Business Performance Management for Financial Performance Management;

Figure 7 is a diagram showing an example of Business Performance Management for Sales Analysis;

Figure 8 is a diagram showing an example of Business Performance Management for AR Analysis;

Figure 9 is a diagram showing an example of Business Performance Management for General Ledger Analysis;

Figure 10 is a diagram showing an example of Business Performance Management for AP Analysis;

Figure 11 is a diagram showing an example of Business Performance Management for Inventory Analysis;

Figure 12 is a diagram showing an example of Business Performance Management for Procurement Analysis;

Figure 13 is a diagram showing an example of interrelations of tables;

Figure 14 is a diagram showing an example of Sales Analysis Schema;

Figure 15 is a diagram showing an example of Financial Analysis Schema;

Figure 16 is a diagram showing an example of Inventory Analysis Suite Schema;

Figure 17 is a diagram showing an example of a Business Performance Management Data Model;

Figures 18a to Figure 18y comprise a diagram showing an example of a data model;

Figure 19 is a diagram showing a example of Business Performance Management Application;

Figure 20 is a diagram showing another example of a screen-shot of the e-Applications console;

Figure 21 is a diagram showing an example of a screen-shot of the e-Applications console;

Figure 22 is a diagram showing an example of a screen-shot of the Financial Analysis e-Application;

Figure 23 is a diagram showing an example of a screen-shot of the Sales Analysis e-Application;

Figure 24 is a diagram showing an example of a screen-shot of the Inventory Analysis Suite of e-Application;

Figure 25 is a screen shot illustrating a step of generating a report;

Figure 26 is a screen shot illustrating a step of generating a report; and

Figure 27 is a screen shot illustrating a step of generating a report.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

Business Performance Measurement System

Figure 1 shows a Business Performance Management (BPM) System 101 in accordance with an embodiment of the invention. The BPM System 101 comprises a BPM Model 102, a Dimensional Data Model 103, a BPM Application 104, and a BPM packaged product 105.

The BPM Model 102 supports the BPM System 101. The BPM Model 102 is demonstrated through the BPM Model Diagrams (see Figures 2 and 3) discussed later. The Dimensional Data Model 103 implements the BPM Model 102. The Dimensional Data Model 103 is demonstrated through the Dimensional Data Model Diagrams (see Figure 17 and Figures 18a to 18y) discussed later. The BPM Application 104 implements the Dimensional Data Model 103. The BPM Application also represents the productization 105 of the system. The BPM Application 104 is demonstrated through the BPM Application 104 diagram (see Figure 19) discussed later.

Built upon an operational framework and a robust production environment, the BPM system helps decision-makers rapidly derive business value from their enterprise data. By using the BPM system, organizations receive a wide, cross-functional view of their ERP and e-business data, which provides a strategic perspective on key performance indicators (KPIs). And they reduce implementation costs and effort, which accelerates time to results.

An aspect of the BPM system relates to the challenges that organizations face when implementing BPM. It provides a solution—the integrated BPM system—that comprises a series of coordinated functional areas. These coordinated functional areas allow companies

to deliver value-laden enterprise-wide BPM solutions that are important to competitive advantage in the e-business economy.

Establishing Business Content

One advantage of the BPM system lies in the quality of its business content. It is the business content that gives end users the ability to answer complicated questions involving numerous business dimensions and quickly gain the insight required to make strategic decisions. The basis of this content combines business intelligence expertise established by broad studies and best practices proven by experience—strategies which have helped many of the world's leading companies generate maximum decision-making value from their data.

BPM Model

The BPM 101 system also relates to the challenges that organizations face when implementing data warehouses and traditional "stove pipe" data marts. It provides a solution—the integrated data warehouse—which comprises a series of coordinated data marts. These coordinated data marts allow organizations to deliver value-laden enterprise-wide business performance management solutions that are important to competitive advantage in the e-business economy.

By using the BPM system according to the embodiment of the present invention, user may answer in-depth questions such as "Which customers in the western sales region have increased their purchases by more than 30 percent in the past three years?" or "How much revenue did we generate from international sales of Product X last November?" These types of complex queries—involving time, geography, product lines, revenues, and other business variables—require that multiple dimensions and levels of detail be examined.

The BPM system allows users to make connections between these cross-functional variables, connections that will provide insight into what is driving the business.

The BPM Model 102 is based on comprehensive information about the business questions that users in specific functional areas face, including hundreds of function-specific

questions common to business people in virtually all industries. In other words, someone who manages a sales force for a pharmaceutical company will face many of the same business challenges as someone who manages a sales force at a textile company or a semiconductor company. These questions can also be the basis of the business measures, dimensions, and attributes. Business rules that govern how to derive measures such as "net profit margin" or "inventory balances"— measures that do not appear in ERP systems and should be created—are also established in the BPM Model 102.

Based on how companies manage their workflows within each functional area, the business questions can be categorized as strategic, tactical, or operational. Information needs associated with each category are reflected in the BPM Model 102. For example: What level of data granularity do users require? How much history do they need? Five years? Three years? How often do they need to refresh data? Do they have to know what happened yesterday to answer a given business question or can they wait until the end of the week?

The Business Performance Management Model

The structure of the BPM Model 102 is presented in Figure 2. The BPM Model 102 is represented as the BPM Foundation 201 that is made up of multiple Business Functional Areas 202 (i.e., Sales, Accounts Receivable (AR), General Ledger (GL), Accounts Payable (AP), Procurement, Inventory, eCommerce, etc.). For the purpose of BPM, each Business Functional Area 202 is divided into Areas of Analysis 203. In an embodiment of the invention, there are over 30 Areas of Analysis, but this number may change as the BPM Model 102 evolves. The content 204 of an Area of Analysis 203 includes the KPIs, Measures, Dimensions and Attributes that are used to support the business analysis that can be performed. The Business Functional Areas 202, the Areas of Analysis 303 and the KPIs, Measures, Dimensions and Attributes 204 can be arranged as shown in Figure 2.

Figure 3 shows an example of a BPM Model. This BPM Model comprises six functional areas of analysis including Sales Analysis 301, AR Analysis 302, GL Analysis 303, AP Analysis 304, Inventory Analysis 305 and Procurement Analysis 306.

The Areas of Analysis of the Sales Analysis 301 may include: Sales Functional Performance 315, Customer Profile, Buying Trends and Satisfaction 316, Product Performance 317, Organizational Effectiveness 318, and e-Commerce Analysis 319. In this embodiment, this functional area relates to 100 business questions, 80 KPIs, 11 dimensions, and 43 reports.

The Areas of Analysis of the AR Analysis 302 may include: AR Functional Performance 320, Customer Credit Scorecard 321, Quality of AR 322, Corporate Self-Appraisal 323, AR Cash Inflow Forecast 324, and AR Organizational Effectiveness 325. In this embodiment, this functional area relates to 77 business questions, 71 KPIs, 12 dimensions, and 28 reports.

The Areas of Analysis of the GL Analysis 303 may include: Financial Performance Reporting and Analysis 326, Budget Analysis 327, Key Financial Ratio Reporting and Analysis 328, Sales Functional Performance, and Operational Performance and Analysis 329. In this embodiment, this functional area currently relates to 60 business questions, 50 KPIs, 11 dimensions, and 24 reports.

The Areas of Analysis of the AP Analysis 304 may include: AP Vendor Profile 330, AP Functional Performance 331, AP Cash Outflow Forecast 332, and AP Organizational Effectiveness 333. In this embodiment, this functional area relates to 80 business questions, 64 KPIs, 12 dimensions, and 28 reports.

The Areas of Analysis of the Inventory Analysis 305 may include: Stock Overview and Valuation Analysis 334, Material Movement Activity Analysis 335, Demand Analysis 336, Material Reservations Analysis 337, Physical Inventory Analysis 338, and Inventory Forecasts 339. In this embodiment, this functional area relates to 150 business questions, 100 KPIs, 15 dimensions, and 49 reports.

The Areas of Analysis of the Procurement Analysis 306 may include: Procurement Vendor Analysis 340, Material Related Expenditure Profile 341, Material Demand Analysis 342, Procurement Process Effectiveness 343, Procurement Organizational Effectiveness 344, Bill

of Material Analysis, and e-Procurement Analysis 345. In this embodiment, this functional area relates to 180 business questions, 139 KPIs, 15 dimensions, and 35 reports.

The BPM Model may also include the following grouping of dimensions: Organizational Dimensions for Financial Analysis 307; Functional Document Dimensions 308; Master Dimensions 309; Operational Entity Dimensions 310; Financial Transaction Activity 311; Universal Dimensions 312; and Functional Specific Dimensions 313. Organizational Dimensions for Financial Analysis 307 may include the following dimensions: Company Consolidation 346, Profit Center 347, Cost Center 348, Business Area 249, GL Budget Version 350, and Chart of Accounts 351. Functional Document Dimensions 308 may include the following dimensions: Accounting Document Class 352, Sales Document Class 353, Promotion 354, Material Movement Document Class 355, Quotation Activity Document 356, Purchase Order Activity Document 357, Requisition Activity Document 358, Contract Activity Document 359, and Procurement Document Class 360. Master Dimensions 309 may include the following dimensions: Vendor 361, Material 362, Customer 363, Customer Demographic 364, and Employee 365. Operational Entity Dimensions 310 may include the following dimensions: Organization 366, Plant 367, Material Storage 368, Storage Bin 369, and Shipping Point 370. Financial Transaction Activity 311 may include the following dimensions: AR Activity Document 371, GL Activity Document 372, and AP Activity Document 373. Universal Dimensions 312 may include the following dimensions: All Time (Time, Fiscal) 374, Unit of Measure 375, Financial Currency Conversion 376, Unit of Measure Conversion 377, User Category 378, Flexi-Dimension 379, and Forecast Version 380. Functional Specific Dimensions 313 may include the following dimensions: Sales Status 381, Procurement Status 382, Release Strategy 383, Valuation 384, Batch 385, and Stock Class 386.

The dimensions are linked with the functional areas and areas of analysis for the purpose of reporting and analysis. For example, Figure 3 shows that the Sales Analysis 301 uses the Sales Document Class 353 and Promotion 354 dimensions from the Functional Document Dimensions 308; the Material 362, Customer 363, Customer Demographic 364 and Employee 365 dimensions from the Master Dimensions 309; the Organization 366 dimension from the Operational Entity Dimensions 310; the All Time (Time, Fiscal) 374,

Unit of Measure 375 and Unit of Measure Conversion 377 dimensions from the Universal Dimensions 312; and the Sales Status 380 dimension from the Functional Specific Dimensions 313. Other functional areas of analysis may use different dimensions from different dimensions. The relationship between functional areas and dimensions are shown in Figure 3 by way of connecting lines 314.

The BPM Model 102 may continue to evolve and grow to include more functional areas, more areas of analysis and more KPIs, measures, dimensions and attributes. Other examples of BPM Model Functional Areas and their respective Areas of Analysis include:

Human Resource Analysis
- Payroll Analysis
- Professional Development Analysis
- Recruiting Effectiveness Analysis

Financial Controlling Analysis
- Cost Analysis
- Profitability Analysis

Customer Relationship Intelligence
- Customer Profiling
- Customer Base Demographics
- Marketing Analysis
- Process Effectiveness Analysis
- Customer Satisfaction

Supply Chain Intelligence
- Vendor Scorecarding
- Demand Forecasting Analysis
- Process Effectiveness
- Inventory Status Analysis
- Procurement Activity Profiling

The BPM Model 102 also supports the following areas of cross-functional performance management, among others: Supply-Side Performance Management (see Figure 4),

Demand-Side Performance Management (see Figure 5), and Financial Performance (or GL) Management (see Figure 6).

Figure 4 shows an embodiment of Supply-Side Performance Management as containing the following functional areas: AP Analysis 304, Inventory Analysis 305, and Procurement Analysis 306. The relevant areas of analysis and dimensions are also displayed in the format of the BPM Model. Figure 5 shows an embodiment of Demand-Side Performance Management as containing the following functional areas: Sales Analysis 301, and AR Analysis 302. The relevant areas of analysis and dimensions are also displayed in the format of the BPM Model. Figure 6 shows an embodiment of Financial Performance Management as containing: AR Analysis 302, GL Analysis 303, and AP Analysis 304. The relevant areas of analysis and dimensions are also displayed in the star schema format of the BPM Model 102.

Some functional areas are further described in detail below.

Sales Analysis

The Sales Analysis 301 of the BPM Model 102 helps analyze of sales raw data to increase sales. Companies may select from a host of key performance metrics and decision-ready reports that enable them to analyze forecast accuracy and pipeline volume, profile leads, calculate average deal size, and examine revenues and profitability. With the Sales Analysis 301 of the BPM Model 102, companies may:

- Evaluate discount practices, target customers who generate the highest margins, and spot clients who cost the most;
- Know about prospects, customers, and product performance; and
- Identify opportunities, increase revenues, minimize costs, and shorten the sales cycle.

Thriving in an electronic marketplace involves embracing e-business and using technology to create, manage, and deliver analytical information. These are some of the activities that users may accomplish quickly with Sales Analysis 301 of the BPM Model 102:

- Increase customer satisfaction and boost win rates;
- Better understand the buying habits of customers;
- Refine the way that the company interacts with customers;
- Improve forecasts and budgets; and
- Analyze channels, industries, customers, order types, product groups, etc.

Companies may use the Sales Analysis 301 of the BPM Model 102 to provide the information used to make decisions that will keep customers, close sales faster, and generate more revenue.

- Get an integrated view of customer touch points;
- Adopt a profit-centric sales model that aligns sales goals with corporate goals;
- Develop more effective planning and forecasting with a big-picture view of the sales function; and
- Analyse sales performance from unlimited perspectives including channel, industry, customer, order type, product group, etc.

The Sales Analysis 301 of the BPM Model 102 provides information used for key analysis and decision making at various management levels within a company's sales and marketing organizations.

A key objective of the sales and marketing functions is to plan, execute, manage, and monitor strategies and plans (ex. sales strategies, campaigns, and product strategies and management) that are in alignment with the corporate mission and will ultimately return the greatest value to its stakeholders. This involves an understanding of how effective an organization has been in generating revenue, as well as who and what have contributed to this performance.

This aspect of the Sales Analysis 301 of the BPM Model 102 delivers analysis which provides insight including:

- Sales process analysis including sales order processing, distribution/order fulfilment, to customer billing contribution of the sales organization (regions,

offices, sales force) to overall revenue and profit margin product line performance analysis and trends; and

- Profiling of customer segments and individuals: assessing buying trends, customer satisfaction in product quality and reliability.

In their efforts to achieve these objectives, managers within the sales and marketing functions should have a keen understanding of "how things are going." This begins with an analysis of the information being captured in the sales process. Managers should have answers to questions on:

- How the organization and its parts are contributing to overall revenue and profit margin;
- How product lines are performing;
- Who are their most valuable customers, what are their buying trends, and how effective are they satisfying customer expectations for quality and reliability; and
- How efficient the sales process is in generating revenue.

The Sales Analysis 301 of the BPM Model 102 delivers information used to answer these questions, with the depth and breadth to meet the needs of managers at various levels of the organization, including:

- High-level executive and senior managers who conduct strategic analysis on how marketing and sales strategies have impacted cross-organizational performance, monitors changes overtime and helps in identifying trends;
- Sales, product and marketing managers who require tactical reporting and analysis targeted at understanding the effectiveness of plans designed to meet corporate objectives; and
- Managers responsible for operational reporting (i.e., sales representative customer base buying profile) and process effectiveness.

The Sales Analysis 301 of the BPM Model 102 addresses areas of analysis within an organization's sales and marketing functions, aimed at assessing the effectiveness of the sales cycle from the sales order forward. Figure 7 shows an example of Sales Analysis

Functional Area 301 details. The Sales Analysis Functional Area 301 includes the following Areas of Analysis:

Sales Functional Performance 315;
Customer Profile, Buying Trends and Satisfaction 316;
Product Performance 317;
Organizational Effectiveness 318; and
e-Commerce Analysis 319.

The Sales Analysis Functional Area 301 uses the Sales Document Class 353 and Promotion 354 dimensions from the Functional Document Dimensions 308; the Material 362, Customer 363, Customer Demographic 364 and Employee 365 dimensions from the Master Dimensions 309; the Organization 366 dimension from the Operational Entity Dimensions 310; the All Time (Time, Fiscal) 374, Unit of Measure 375 and Unit of Measure Conversion 376 dimensions from the Universal Dimensions 312; and the Sales Status 381 dimension from the Functional Specific Dimensions 313. Other functional areas of analysis may use different dimensions from different groupings of dimensions. The relationship between the functional area and the dimensions are shown by way of connecting lines 314.

Sales Functional Performance

A fundamental measure of corporate effectiveness in marketing its products and services is the question of "How much have we sold?"

Managers across the organization should know how revenue, volume and margin expectations are being met. They should know what parts of the organization are delivering on expectations, and how various regions are performing. These requirements filter down to the sales office and sales representative needing to know how they are doing, and how their performance is meeting expectations today and over time.

The Sales Analysis 301 of the BPM Model 102 delivers information for in-depth analysis of sales revenues (orders and invoiced), volumes and margin across the sales organization, addressing such questions as:

- How much has the company sold this period – revenue and volume? How does it compare to last period? What is the percent increase or decrease? What has been the trend over time?
- What regions have done well for us? Where are we losing ground? Are our high revenue regions delivering on margin? Are we seeing the percent growth necessary?
- How have the various sales organizations, channels or divisions contributed to our performance? Which are most effective? Who is meeting revenue and margin expectations, and who is not?
- How have corporate sales offices contributed this year? How do they rank?
- Who are the sales reps that are performing within their sales offices – and who is not? How do reps rank on revenue, volume, and margin? How has their contribution changed over time?

The Sales Functional Performance area of analysis 315 assists with the following functions 701:

Revenue, volume, and margin analysis and trending;

Analysis of regional sales performance

- contribution to overall performance by revenue and product line;

Comparative evaluation and monitoring of revenues, volume, contribution to profit margin performance across sales organization, distribution channels, divisions; and

Evaluate contribution and ranking across sales offices, sales representatives.

Sample sales functional analysis KPIs include 702:

Total units sold (% change);

Total revenue of units sold (% change);

Average order value; and

Profit margin per order.

<u>Customer Profile, Buying Trends and Satisfaction</u>

Organizations should have a clear understanding of who their customer base is, what they want, and how their needs are being met.

The effectiveness of corporate sales and marketing strategies, coupled with quality of product and service, should translate into greater "share of customer"- which can be measured by changes in the breadth of product purchased, the volume of products purchase, and changes in contribution to revenue and margin over time.

The Sales Analysis 301 of the BPM Model 102 allows for analysis of customer trends and contribution, changes in buying patterns, and corporate performance and key satisfaction measures. Examples of the types of questions that can be addressed include:

- How large is the customer base? How has this changed over time?
- What is the average revenue per customer? Which customer groups offer the highest total and average revenue contribution? Which groups are contributing most to volume? Most to margin? How do customer groups/segments rank in contribution to overall revenue?
- Have the average purchases per customer been increasing or decreasing over time? Have the number of products being purchased increased or decreased over time?
- Have revenues from a specific customer group been increasing over time – is this an indication of trend – an opportunity? Have the revenues for these groups decreased – and if so is it a product offering or satisfaction issue?
- As a sales office, what has been the contribution of the customer base to our objectives? Who are our high versus low margin customers? Has this been changing over time? What have they been buying, how much and how often?
- As a sales representative, how has my customer base's profile changed over time? What are they buying from me – how much and how often?

Customer satisfaction questions include:

- What has been the return pattern of our customer base? Are there return levels outside exception levels? Are these high returns specific to a customer group a specific customer? Are the returns specific to a region or sales office?

- Have we been shipping on time - as promised? How has this level of performance changed over time? Have late deliveries been to specific regions? What have our shipping patterns been within specific customer groups or customers?

The Customer Profile, Buying Trends and Satisfaction area of analysis 316 assists with the following functions 703:

Customer segment and individual customer profiling: monitor trends in customer base size, revenue as percent of total, product mix, customer ranking;

Comparative analysis of customer groups: buying trends, contribution to revenues, product line sales, profitability;

Sales rep view of buying patterns: average order sizes, number of purchases in a Period; and

Measure customer satisfaction: product return and credit memo, on-time delivery.

Sample customer profile analysis KPIs include 704:

Total units sold (% change): average units sold, by customer/group;

Count of materials (list) by customer; and

Customer contribution to profit $.

Product Performance

Knowing customers and what they want opens a window to view the effectiveness of the corporate product offering. A key component to developing market strategies and product planning is an understanding of the markets segments, how the current product offering addresses the customer requirements, and how this has evolved over time. Sales management and their teams should also have analysis that allows them to assess the effectiveness of their operations and how products are contributing to achieving their goals within their markets.

The Sales Analysis 301 of the BPM Model 102 delivers product analysis to answer the questions of both the sales and marketing functions, which include:

- What product lines or specific products are we selling? How much revenue are they generating? How have these lines contributed to overall margin? How have these products performed to the previous period? and over time? What has been the rate of change? Which products are emerging as leaders? Which products are experiencing declining share?
- Where have the products been selling? Which regions? Which customer groups? Rank the leading customer segments for these products.
- Who has been selling these products? Which sales offices have performed in specific product lines? Which representatives have championed sales in their regions?
- What products has the sales office been selling? What level of revenues or contributions has the company generated from specific product lines or products? What volumes have the company moved this period? How does it compare to the previous period?
- As a sales representative, what have I been selling? How has my product mix impacted my potential contribution to revenues and margins? Am I meeting my volume targets? How has my performance change over time?

The Product Performance area of analysis 317 assists with the following functions 705:

Comparative analysis across products and product lines: volume sales and contribution to revenue and margins, product ranking;

Analyze and rank regions and customer segments contribution to product sales; and

Monitor sales performance for product lines across the sales organization (down to sales representative): identify product sales mix, high performance as well as volume shortfall, impact of promotion and campaigns.

Sample product performance analysis KPIs include 706:

Total units sold (% change) by product / product line; and

Contribution to profit by product / product line (% change over time).

Organizational Effectiveness

The importance of a company's strong understanding of its customer base and the effectiveness of its product offering has been identified as key. However, if the organization is to deliver on its commitment to maximizing the value delivered to its shareholders, the sales function should extend its contribution to the goal by evaluating the effectiveness of the sales, shipping and invoicing process.

The Sales Analysis 301 of the BPM Model 102 provides details on the process ranging from addressing questions on volumes of transactions being processed and various points in the demand chain to how resources are being allocated. Examples of the types of questions that can be addressed include:

- How many sales orders/shipments/invoices are being processed per year? How does this volume relate to revenue? Has this been improving over time?
- Which organizations are producing the highest volumes of transactions? How does their volume of transactions compare to the average revenue per transaction across the organization?
- Which shipping points are experiencing the highest volume of delivery processing? Has this been an ongoing trend? Does this relate to late deliveries? How does the number of late deliveries compare in the high volume shipping points compared to others?

The Organizational Effectiveness area of analysis 318 assists with the following functions 707:

Evaluate the effectiveness of the sales, shipping and invoicing process;

Evaluate sales representative performance;

Analyze trends in transaction volumes and values being processed at various points in the demand chain (orders, returns, goods issued, invoices, credit and debit memo requests, etc.); and

Monitor distribution of transaction activity across organizational units (sales organization, division, distribution channel, shipping points).

Sample organizational effectiveness analysis KPIs include 708:

Count of orders shipped on time (as % of total);

Count of orders shipped across shipping points; and

Sales revenue by sales representative (% change).

e-Commerce Analysis

The e-Commerce Analysis area of analysis 319 assists with the following functions 709:

Analyze the activity level with e-commerce channels; monitor sales volumes and units by product and customer;

Comparative analysis of and customer buying trends between e-channels and traditional sales channels; analyze the level of cannibalization of traditional sales channels over time;

Assess which customers and products are best suited for e-channel;

Consolidate customer sales activity from across multiple channels

- fuller customer profile (includes demographic detail); and

Evaluate success of promoting e-commerce channel in increasing sales revenue and purchase volumes.

AR Analysis

AR Analysis 302 of the BPM Model 102 helps analysze raw AR sub-ledger transaction level data to manage a corporate asset. The AR Analysis 302 of the BPM Model 102 restructures AR data into key measurable facts used for strategic planning, program management and execution, and AR performance monitoring and reporting. Companies may select from a host of key performance metrics and decision-ready reports that enable them to continuously analyze the effectiveness of their AR function, performance of existing resources, and fully understand the existing customer base.

Thriving in any dynamic industry includes embracing e-business and using web enabled technology to create, manage, and deliver analytical information. These are some of the activities that may be accomplished quickly with the AR Analysis 302 of the BPM Model 102:

- Monitor AR effectiveness and improve collection efficiency of credit accounts;
- Determine potential accounts shifts to high risk positions;

- Profile customer credit performance;
- Present overview of AR accounts for the purpose of factoring and financing;
- Evaluate functional transaction volumes and the impact on AR performance;
- Assess analyst performance as it relates to account responsibility; and
- Analyze cash inflow projections for use in cash flow planning.

AR Analysis 302 of the BPM Model 102 provides information for analysis and decision making at various management levels within a company's AR function. The availability of customer account activity information and analysis equips the organization with the details necessary to shorten the sales cycle while minimizing delinquent accounts and bad debts - improving corporate cash flow.

A function of the AR organization is to ensure the full and timely collection of credit sales from the customer base. However, to successfully achieve this goal, AR should strive to:

- Ensure timely account payments and accelerate AR cash inflow;
- Effectively management credit and collections policies which promote sales and maintain reliable credit accounts;
- Contribute in reducing operating costs and overall cost to serve customers;
- Improve the AR process and management;
- Support related corporate functions - sales and marketing, finance and control, treasury; and
- Improving customer relations through the use of full information, comprehensive analysis and clear communication.

These efforts require that managers within the AR function have a keen understanding of "how we have done and where are we going?" This begins with an analysis of the information being captured in the AR process, using industry best practices.

Managers should know:

- If the organization is meeting it's objectives for customer collections;

- Customer credit profiles - which customers are paying on time, and which are not;
- What is the expected cash inflow - how much cash do we expect in the future, and when;
- Where the greatest risks to cash inflow exist; and
- How effectively the organization is performing with the given resources.

AR Analysis 302 of the BPM Model 102 delivers information to answer these core questions, with the depth of analysis built on known industry practices used by managers at various levels of the organization, including:

- High-level executive and senior managers who conduct strategic analysis on how the company is being paid, managing functional performance and determining cash inflow for planning; and
- AR analysts responsible for managing and monitoring customer accounts and payment trends, handling adjustments, and intercepting potential collection risks.

AR Analysis 302 of the BPM Model 102 is focused on providing managers with information used to understand how well their organization is doing and why. The analyses that have been packaged are designed to provides managers with what they should assess:

- How effectively AR has been in meeting its functional objectives, and why these performance levels are being achieved;
- How effectively resources are being used to achieve these results; and
- How key information supports cross-functional analysis as it relates the customer and financial analysis.

Figure 8 shows an example of the AR Analysis Functional Area 302. The AR Analysis Functional Area 302 includes the following Areas of Analysis:

AR Functional Performance 320;

Customer Credit Scorecard 321;

Quality of AR 322;

Corporate Self-Appraisal 323;

AR Cash In-flow 324; and

Organizational Effectiveness 325.

The AR Analysis Functional Area 302 uses the Company Consolidation 346, Cost Center 348, Business Area 349, and Chart of Accounts 351 dimensions from the Organizational Dimensions for Financial Analysis 307; the Accounting Document Class 352 dimension from the Functional Document Dimensions 308; the Customer 363 and Employee 365 dimensions from the Master Dimensions 309; the Organization 366 dimension from the Operational Entity Dimensions 310; the AR Activity Document 371 dimension from the Financial Transaction Activity Dimensions 311; and the All Time (Time, Fiscal) 374, Unit of Measure 375, and Unit of Measure Conversion 377 dimensions from the Universal Dimensions 312. The relationship between the functional area and the dimensions are shown by way of connecting lines 314.

AR Functional Performance

A company looks to its AR team to ensure that the organization is being paid what is due, when it is due. Any deviations from this expectation must be assessed and addressed by analysts and managers as required. To measure how effectively the function is performing, key performance indicators are monitored over time, across organizations, and compared to industry standards.

AR Analysis 302 of the BPM Model 102 delivers metrics and analysis to measure the functional performance of the AR function. The information provided will answer questions such as:

- How quickly is the organization collecting? What is the average collection period? How does this relate to particular analysts?
- What is the AR Turnover? Is it within target?
- What is the Days of Sales Outstanding (DSO)? How has this changed over time?
- What money is due this period? What percentage of dollars is past due?
- What percent of the money due is moving to high risk?
- What percentages of accounts are not meeting terms? What is the value of their overdue accounts?

- How has bad debt evolved over time?
- How has the AR function evolved over time in its ability to collect on time and minimize bad debt?

The AR Functional Performance area of analysis 320 assists with the following functions 801:

Evaluate effectiveness of the AR function in collecting outstanding accounts within terms;

Monitor organization aging schedule;

Assess high risk receivables and bad debts accounts;

Manage average collection period, and track how performance has changed over time; and

Monitor the organizations Days of Sales Outstanding.

Sample AR analysis KPIs include 802:

Average Collection Period;

Aging Schedule;

Days of Sales Outstanding;

Average Days Past Due;

Collection Effectiveness Index; and

Bad debt loss index.

Customer Credit Scorecard

Managers and analysts of the AR function should understand the current credit position of the customer base, as well as profiling customers and customer groups - not only where they are today, but how this has changed over time.

AR Analysis 302 of the BPM Model 102 provides information about a customer or a group of customers' payment history, as well as metrics to measure the effectiveness of the AR function. The organization should understand how customers have been paying, what is the cost to serve them, and which ones present risk of non-payment in any given period. This

type of information not only gives additional insight to other functions within the organization, but it also serves as a basis for risk management, and credit analysis.

A Customer Credit Scorecard 321 allows managers and analysts to answer questions such as:

- What is the current status of a customer's account? What are the transactions that define the current status (including invoices, payments and adjustments)?
- What is the customer's aging schedule?
- What has the payment trend been for customers? What is the customer's average days to pay? Weighted average days to pay?
- Does the customer take advantage of discounts offered? What percent of discounts offered are taken? What is the value?
- What is the cost to serve customers?
- How has a customer's purchases, activity and credit evolved over time?
- Which customers are problematic and why?
- What is the profile of the customer base?
- What is the profitability of a customer to our organization?
- How does the customer's performance and credit rank against others?

The Customer Credit Scorecard area of analysis 321 assists with the following functions 803:

Monitor payments trends of individual customers and customer groups: percent of dollars and transaction past due;

Analyze customer patterns in acceptance of terms;

Assess customer transactions: number of cheques to invoices, adjustments;

Evaluate customer profitability and cost to serve; and

Monitor customer specific aging schedules by number of transactions, and total Dollars.

Sample customer credit scorecard analysis KPIs include 804:

Customer aging schedule;

Customer average days to pay;

Percentage and total of customer transactions and dollars past due;
Cost to Serve customer; and
Customer Profiles.

Quality of AR

In maximizing cash flow, many organizations sell or borrow against their current AR balances. In using this vehicle, financial partners should have the organization present a profile of the quality of the AR against which financing is being requested. This includes the aging schedule of the accounts, as well as any other information used to display the low risk nature of the credit that is being considered for financing.

AR Analysis 302 of the BPM Model 102 provides information on current account balances from an organizational viewpoint down to customer transaction detail. AR managers may have information to support financing proposals and the level of detail appropriate for the various requirements of the financing institutions. This may include customer information on bad debt, value of funds past due, and the average collection period.

The Quality of AR area of analysis 322 assists with the following functions 805:

Evaluate customer base and identify best candidates for financing or sale of AR;
Identify accounts that require action to prevent potential negative impact on financing requests;
Report on aging schedules, and credit history for selected customers; and
Present detailed customer credit profiles demonstrating stability of accounts in support of financing institution requests for information.

Sample quality of AR analysis KPIs include 806:

Customer base balance information;
Customer base aging schedule;
Customer profile detail data on average days to pay; and
High risk, bad debt profiles.

Corporate Self-Appraisal

The AR function detects problems in the supply chain and customer service as they manifest themselves in the form of delayed payments. As a company assesses the service it receives from its vendors, the company should also measure itself against the same standards.

Problems in collections may be due to a variety of issues - stemming from supply chain fulfilment to the billing process. AR, through the processing of reason codes and adjustment analysis can provide meaningful information to determine if the organization has been effective in satisfying the promises made to its customers. Have customers delayed or adjusted payments due to:

- Poor product quality;
- Late delivery;
- Inaccurate delivery quantities;
- Errors in pricing and billing;
- Delivery of the wrong product; and/or
- Unclear billing practices.

A proactive approach to assessing these factors and improving process to minimize discrepancies or delays in payment should enhance the customer experience and satisfaction, contribute to customer loyalty, and eliminate non-value adding costs due to inefficiencies.

AR Analysis 302 of the BPM Model 102 provides detailed analysis of adjustments and their reasons. The analysis delivered provides managers with the information used to determine:

- What is the value of adjustments received?
- What are the reasons for adjustments? What are the related values and frequency? How are they evolving?
- Where are the adjustments emerging? Which customers? Which regions? Which analysts?
- Have adjustment levels improved in response to corporate action in the form of changes to process or policies within the supply chain, fulfilment process and billing?

The Corporate Self-Appraisal area of analysis 323 assists with the following functions 807:

Evaluate the adjustment activities and trends;

Assess reasons for adjustments

- the related values and frequency, and identify potential problem areas;

Identify the sources and distribution of specific adjustments types:

by customer, by region, by AR analyst; and

Evaluate the impact of changes in corporate practices (ex. supply chain, fulfilment or billing) on adjustment and collections;

Sample corporate self-appraisal analysis KPIs include 808:

Adjustment counts by group and type;

Total adjustment $ values by group and type; and

Adjustment counts and $ value as a percent of total.

AR Cash Inflow Forecasts

Cash management planning is an important function of the Treasury organization - working to ensure that there is sufficient cash available in the future to cover AP for purchases, expenses, financing and operations. AR possesses key information that can provide forecasts of cash inflow based on existing credit items and their related terms of payment.

AR Analysis 302 of the BPM Model 102 provides forecasts of cash inflows based on three scenarios:

- Expected cash inflow based on the assumption that no accounts take advantage of discount payment terms;
- Expected cash inflow based on the assumption that all accounts take advantage of discount payment terms; and
- Expected cash inflow based on the expected days to pay for each account based on an analysis of their payment patterns to date.

These cash inflow forecasts provide the Treasury function with the information used to estimate the cash inflow from the customer base, which, when compared with cash outflow

analysis delivered in the AP Analysis 304 of the BPM Model 102, provides valuable insight for cash flow planning.

The AR Cash Inflow Forecast area of analysis 324 assists with the following functions 809:

Project future AR Cash Inflow based on current open items and payments terms;

Analyze expected incoming cash into the future by day, based on three scenarios:

- amount due if no customers take terms
- amount due if all customers take terms
- amount due based on analysis of customer's average days to pay; and

Combine with AP Cash Outflow analysis for AR-AP Cash flow Analysis.

Sample AR cash inflow forecast KPIs include 810:

Receivables dollars and item counts due into the future by day; and

Three scenario evaluation: no discounts, all discounts, and average days to pay.

AR Organizational Effectiveness

As any departmental function within an organization, AR should manage its account base as efficiently as possible - this relates both to the best use of resources and budget.

Inefficiencies in the AR process could result in increased cost to service customers, errors due to poorly distributed workload, and customer dissatisfaction from transacting through poorly designed processes. An understanding of the AR function provides a view of where non-value-adding steps can be eliminated, and how the cash operating cycle time can be reduced.

AR Analysis 302 of the BPM Model 102 delivers robust analysis of how AR resources are performing in working to achieve functional objectives. Managers will have the information to answer questions that include:

- How has account distribution across analysts changed as business has increased? How does this distribution compare based on total number of accounts, and total dollars managed?

- How do the average days to collect from accounts compare across analysts? Does an increase indicate overloaded resources?
- How have transaction volumes changed with an evolving customer base? How has the ratio of new to open transactions changed over time?
- How has the total number of transactions being processed by the AR department changed over time? Do increases in processed transaction per employee impact AR key performance indicators?

The AR Organizational Effectiveness area of analysis 325 assists with the following functions 811:

Evaluate effectiveness of AR analysts and contribution to functional performance based on customer base and proportion of AR dollars under management;

Monitor trends in new and open transaction volumes by type;

Assess distribution of workload across existing resources (analysts and clerks) as it relates to support in achieving AR objectives; and

Evaluate process effectiveness (time to clear open items).

Sample AR organizational effectiveness KPIs include 812:

New to Open transaction counts, values and ratio; and

By analyst analysis of customers under management (count), account balances (and % of total), DSO, average days to collect, bad debt.

As has been illustrated, AR Analysis 302 of the BPM Model 102 delivers information used by management to effectively analyze the performance of an organization's AR function. The AR process may also provide important information used in analysis by other functions which include:

Sales and Billing:

As the final phase of the sales process (sales to cash), AR provides valuable analysis alongside the details form the sales and billing processes. The analysis allows managers to better understand customer and customer group payments patterns and credit worthiness as it relates to sales history.

GL:

As a sub-ledger of the GL, AR provides details used to explain changes in GL AR line items.

Treasury:

The combination of AR cash inflow projections and AP cash outflow projections provide treasury with the information used to plan cash flow.

The use of conforming dimensions (ex. customer, chart of accounts, organization, etc.) ensure that while the reporting within each functional area as delivered by the BPM Model 102 (including Sales Analysis 301, AR Analysis 302, GL Analysis 303, AP Analysis 304) is robust, they also provide the ability to report across the BPM Model 102. The design for integration across the BPM Model 102 allows for a view of information across functions - hence ensuring that AR information is available to complete the analysis performed in other functions within the organization.

General Ledger Analysis

GL, finance function, and financial accounting function are used interchangeably throughout this section.

GL Analysis 303 of the BPM Model 102 helps analyze raw GL transaction level data to manage a corporate asset. The GL Analysis 303 of the BPM Model 102 restructures GL data into the key measurable facts used for strategic planning, program management and execution, and financial performance monitoring and reporting. Companies may select from a host of key performance metrics and decision-ready reports that enable them to continuously analyze their company's financial health.

Thriving in any dynamic industry includes embracing e-business and using web enabled technology to create, manage, and deliver analytical information. These are some of the activities that may be accomplish quickly with the GL Analysis 303 of the BPM Model 102:

- Reduce period-end close processes;

- Accelerate financial reporting and distribution cycles, freeing up time for financial analysis to improve business performance;
- Allow financial professionals to analyze business performance, not merely collect and report data;
- Give department managers access to their financial information so they can assess changes and impacts and align their activities with corporate objectives;
- Equip managers to produce up-to-date reports of key financial ratios;
- Trace and grasp shifts in expenses and revenues over time;
- Compare actual performance versus plan;
- Easily determine whether and how much organizations are contributing to profit or revenue;
- Evaluate the effect of currency rate fluctuations on financial performance; and
- Pinpoint the real issues or opportunities that drive profitability.

Finance Organizations have two main functions - Financial Accounting and Management Accounting and Control. Financial Accounting is performed for external consumption and is used in reporting financial results on a periodic basis to shareholders, creditors, and government entities. On the other hand, Management Accounting and Control is intended for internal consumption and is used in planning and operating a company by managers and employees.

The source of data for the GL Analysis 303 of the BPM Model 102 may be the GL of the organization. Accounting principles form the basis of the standards, rules, and definitions of financial statements used for reporting and analyzing a corporation's financial performance. The GL Analysis of the BPM Model 102 meets these standards while being flexible enough to adapt to global variations.

GL Analysis 303 of the BPM Model 102 provides the information used for analysis and decision making at various management levels: from executives to financial management. One objective of the finance function is to plan, and monitor strategies for maximizing the return on investment for corporate stakeholders (i.e., shareholders). The financial plan and strategy should be in alignment with the corporate mission and should return the greatest

value to its stakeholders. This involves an understanding of how effective an organization has been in generating revenue, utilizing its cash flow, and leveraging its assets while minimizing costs.

In their efforts to achieve these objectives, financial executives should have a keen understanding of "how things are going." This begins with an analysis of the information being captured in the GL. The finance department should have answers to questions on:

- How each part of the corporation is contributing to overall revenue and profit margin;
- How effectively the organization is leveraging its assets, liabilities, and cash flow; and
- How effective the corporation has been at returning value to its shareholders.

As the entity responsible for executing the corporation's business plan, management should be able to monitor financial performance within its areas of responsibility. To do this effectively, management should have access to detailed information on revenue and expenses, assets and liabilities. Given access to the right information, management can find answers to questions such as:

- How each cost/profit center is performing versus the actual budget/plan;
- What is driving profit;
- What is driving expense; and
- What are the key financial trends over time, are they positive or negative, and at what rate are they changing.

GL Analysis 303 of the BPM Model 102 delivers information used to answer these questions, with the depth and breadth necessary to meet the needs of managers at various levels of the organization, including:

- High-level executive and senior management who develop the corporate business plan, perform strategic analysis, examine how corporate strategies have impacted performance, and monitor the progress of the corporation toward meeting its financial performance objectives;

- Financial analysts who are concerned with short term and long term financial planning, reporting and analysis; and
- Executives and management who are responsible for executing the corporation's business plan

The GL Analysis 303 of the BPM Model 102 (or the Financial Accounting function) plays a role in the preparation and analysis of financial transactions which serve as barometer of their company's financial health. This information is used in strategic planning, program management and execution, and financial performance monitoring and reporting.

GL Analysis 303 of the BPM Model 102 provides analysis used to:

- Reduce period-end close processes, accelerate financial reporting and distribution cycles;
- Allow financial professionals to analyze business performance, not merely collect and report data;
- Distribute financial information applicable to department managers for analysis and planning;
- Trace and grasp shifts in expenses and revenues over time;
- Compare performance: actual versus plan;
- Easily determine whether and how much organizations are contributing to profit or revenue; and
- Pinpoint and real issues or opportunities that drive profitability.

No two companies are alike in how they structure the Chart of Accounts in their GL system. The GL Analysis 303 of the BPM Model 102 addresses this fact by providing automated configuration utilities to capture the complete structure of the GL - minimizing or reducing the management effort. Much of this information is determined automatically during installation but certain GL related data structures may not be automatically deciphered. For instance, an "account name" may have three, four, or more components encoded in it such as Legal Entity, Management Entity, Account Group, Account Type, Account, and GL Transaction number. The GL Analysis 303 of the BPM Model 102 captures this account hierarchy, allows a company to specify the meaning of each part of the account key by

account type (i.e., assets, liabilities or equity), and incorporates the specification into its data structure. This permits a user to "drill down" into the set of all GL transactions and perform analysis at each level, select GL transactions by type or owner, or aggregate and summarize GL transactions in any valid combination. Once installation is complete, no additional work is necessary to ensure that the Chart of Accounts data structure can be easily navigated for detailed analysis and reporting.

GL Analysis 303 of the BPM Model 102 addresses key areas of financial analysis aimed at assessing the financial health of the company. Figure 9 shows an example of the GL Analysis Functional Area 303. The GL Analysis Functional Area 303 includes the following Areas of Analysis:

Financial Performance Reporting and Analysis 326;
Budget Analysis 327;
Key Financial Ratio Reporting and Analysis 328; and
Operational Reporting Analysis 329.

The GL Analysis Functional Area 303 can use the Company Consolidation 346, Profit Center 347, Cost Center 348, Business Area 349, GL Budget Version 350, and Chart of Accounts 351 dimensions of the Organizational Dimensions for Financial Analysis 307; the GL Activity Document dimension of the Financial Transaction Activity Dimensions 311; and the All Time (Time, Fiscal) 374, Financial Currency Conversion 376, and Flexi-Dimension 379 dimensions of the Universal Dimensions 312. The relationship between the functional area and the dimensions are shown by way of connecting lines 314.

Financial Performance Reporting and Analysis

At a minimum, all companies typically produce financial statements at least once each fiscal year if only for tax purposes. A public corporation, however, typically needs to publish its financial statements quarterly to meet legal commitments. These financial statements provide valuable insight into the performance of the organization. This is especially true when the information is presented in a format that presents the changes in financial performance over time. With the GL Analysis 303 of the BPM Model 102, detailed

Financial Statements may be produced "on-demand" virtually automating a typically complex and time-consuming process.

This built-in flexibility is also extended to the analysis and reporting environment of the GL Analysis 303 of the BPM Model 102. Information in the e-Application is structured for ease of access and query performance. The pre-packaged financial reports and multidimensional cubes are easily modified to suit specific requirements. And the format and content of each report may be quickly changed to suit the needs of the user.

Income Statement Analysis

The income statement is a summary of revenue, expenses, and income for a given period of time. The GL Analysis 303 of the BPM Model 102 provides a set of pre-configured variations of the Income Statement which may include:

- 'Period over period' which provides a comparison of change over time. The time periods can be selected by the user (i.e., month, quarter, year, fiscal year, year-to-date). This permits the user to analyze changes in revenue and expenses based on a point in time, period, or seasonality.
- 'Trends over time' presents the Income Statement by month. This shows monthly activity from the beginning of the year to the current period.
- 'Percentage of total revenue' shows an income statement in which each row is calculated as a percentage of total revenue. The user may drill down on each group of accounts to view detailed percentages of total revenue.
- 'Detailed Income Statement' shows an income statement grouped and sorted to the lowest level of detail in the account hierarchy.
- 'Income Statement variance from Budget' (expense and revenue forecast) presents a high-level income statement that compares budget against actual results. Calculations show variance and percent variance of actual results to budget.

Balance Sheet Analysis

The balance sheet represents the accounting equation-Assets = Liabilities + Owners Equity-at a point in time. In a balance sheet an analyst is looking for relative

changes which are useful in understanding how the business is performing. The GL Analysis 303 of the BPM Model 102 may present the balance sheet in several different formats, such as:

- 'Balance Sheet Time Comparisons' shows a detailed time period comparison. It allows the comparison of the current month, quarter, and year-to-date with the same periods in the previous fiscal year.
- 'Balance Sheet Time Trends' shows a detailed time period comparison of the balance sheet by month. Columns show monthly balances from the beginning of the year to the current period.
- 'Percentage of Total' presents a balance sheet statement in which each row is calculated as a percentage of the total against the group totals (assets, liabilities). This view supports drill down on each group of accounts to view detailed percentages of the totals.
- 'Detailed Balance Sheet' shows a balance sheet with line items grouped and sorted to the lowest level of detail in the account hierarchy.
- 'Balance Sheet budget variances' compares budget against actual results at a high level. Calculations include variance amount and variance as a percentage of actual to budget. Further analysis can be performed over time, business area, company and GL accounts.

The Financial Performance Reporting and Analysis area of analysis 326 assists with the following functions 901:

Produce detailed financial statements "on-demand" with ability to drill down from account hierarchies to transaction level detail for each GL account;

Multi-dimensional Income Statement and Balance Sheer Analysis: Period over period, multiple period views (month, quarter, year, fiscal year, year-to-date), trends over time, vertical analysis, Income Statement variance from budget;

Trial balances; and

Analyze across financial management entities: profit and cost centres, business areas

Sample financial performance reporting analysis KPIs include 902:

Account balances; and

% change of account balance summaries over time.

Budget Analysis

The corporate planning function produces a set of projected revenues and expenses within each management entity. These projections become the financial objectives or budget by which each manager can report against. Monitoring actual expenses versus budget or actual revenues versus budgeted revenues can therefore be a critical and continuous activity. The GL Analysis 303 of the BPM Model 102 presents the "budget" information alongside actuals in a variety of reports and multidimensional cubes so the manager may determine:

- 'What is Driving Income Statement Variances?' This report shows an income statement with a variance measure to reveal business segments that are having unexpected results.
- 'Variance Report - Income Statement' shows a view of the income statement expense categories. Calculations show variance and percent variance of actual results to budget, and variances are ranked to reveal over-budget and under-budget accounts.
- 'What is driving Balance Sheet Variances?' This report reveals business segments that are having unexpected results based on a variance measure.
- 'Variance Report - Balance Sheet' shows a detailed view of balance sheet expense categories. Calculations show variance and percent variance of actual results to budget, and variance are ranked to reveal over-budget and under-budget accounts.

The Budget Analysis area of analysis 327 assists with the following functions 903:

Multi-dimensional financial analysis of actuals against budget;

Evaluate keys drivers in the Income Statement;

P&L variance reporting - Income Statement expense categories, rank accounts with respect to successfully achieving plan; and

Balance Sheet variance reporting.

Sample budget analysis performance reporting analysis KPIs include 904:

Account budget $; and

Variance between account budget $ and account balance actuals.

Key Financial Ratios Analysis

The financial manager's job can be broken down into a series of broadly defined topics, including capital budgeting, dividend policy, stock issue procedures, debt policy, and leasing. But in the end the financial manager should consider the combined effects of these decisions on the firm as a whole. The GL Analysis 303 of the BPM Model 102 allows the finance department to use financial data to analyze a firm's past performance and assess its current financial standing. For example, being able to quickly check whether the company's financial performance is in the ballpark of standard practice.

Financial managers use long-term financial plans to establish concrete goals and to anticipate surprises. Short-term planning, where the focus is on ensuring that the firm has enough cash to pay its bills and puts any spare cash to good use is also a critical practice. The GL Analysis 303 of the BPM Model 102 provides information for understanding the past to better plan for the future.

The time-honored method of analyzing performance is financial ratio analysis. Financial ratios are a convenient way to summarize large quantities of financial data and to compare the firms' performance. These ratios fall into three groups: leverage ratios, liquidity ratios, and profitability or efficiency ratios. The GL Analysis 303 of the BPM Model 102 automatically calculates and presents the most common measures in each group.

- Leverage Ratios including Debt to Asset and Times Interest Earned;
- Liquidity Ratios including Current, Quick (or Acid Test), Fixed Asset Turnover, Total Asset Turnover; and
- Profitability or Efficiency Ratios including Profit Margin, Inventory Turnover, Return on Assets, Return on Equity.

'Ratios Analysis' displays a time period comparison of key indicators that gives an overview of business performance. The analysis compares a period of time with the same period in the previous fiscal year. As well, the analysis compares the ratios calculated from actual financial data versus budgeted or planned:

- Current Ratio / Current Ratio Budget;
- Quick Ratio / Quick Ratio Budget;
- Inventory Turnover / Inventory Turnover Budget;
- Fixed Asset Turnover / Fixed Asset Turnover Budget;
- Total Asset Turnover / Total Asset Turnover Budget;
- Debt to Asset / Debt Asset Budget;
- Time Interest Earned / Time Interest Earned Budget;
- Profit Margin / Profit Margin Budget;
- Basic Earning Ratio / Basic Earning Ratio Budget;
- Return on Assets / Return on Assets Budget; and
- Return on Equity / Return on Equity Budget.

The key financial ratios described above may be calculated as follows:

Coverage or Leverage Ratios

Leverage Ratios summarize the firm's financial leverage.

Debt to Asset Ratio: Financial leverage is usually measured by the ratio of long-term debt to total long-term capital:

$$\text{Debt ratio} = \frac{\text{long-term debt + value of leases}}{\text{Long-term debt + value of leases + shareholders' equity}}$$

Times Interest Earned: Another measure of financial leverage is the extent to which interest is covered by earnings before interest and taxes (EBIT) plus depreciation.

$$\text{Times interest earned} = \frac{\text{EBIT + depreciation}}{\text{Interest}}$$

Liquidity Ratios

Liquidity Ratios summarize the ability of a company to repay debt.

Current Ratio: (Also referred to as the Working Capital Ratio) Current assets are those assets that the company expects to turn into cash in the near future; current liabilities are liabilities that it expects to meet in the near future:

$$\text{Current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

Quick (or Acid-Test) Ratio: Some assets are closer to cash than others and it may make sense to not include inventories and prepaids (this is a stricter measure of Working Capital):

$$\text{Quick ratio} = \frac{\text{Cash, marketable securities and receivables}}{\text{current liabilities}}$$

Asset Turnover: Instead of looking at a firm's liquid assets relative to its current Liabilities it is useful to measure net sales relative to the firm's average total assets.

$$\text{Asset Turnover} = \frac{\text{Net sales}}{\text{average total assets}}$$

Total Asset Turnover: A variation of the Asset Turnover is to include Inventory.

$$\text{Total Asset Turnover} = \frac{\text{current assets}}{\text{average daily expenditures from operations}}$$

Profitability and Activity Ratios

Financial analysts employ Profitability Ratios to judge how efficiently companies are using their assets.

Profit Margin: To know what proportion of sales finds its way into profits, you look at the profit margin

$$\text{Profit Margin} = \frac{\text{Net Income}}{\text{Net sales}}$$

Inventory Turnover: This is the rate at which companies turn over their inventories.

$$\text{Inventory Turnover} = \frac{\text{cost of goods sold}}{}$$

average inventory

Return on Assets: A common measure of performance is the ratio of income to total assets.

Return on total assets = $\frac{\text{EBIT - taxes}}{\text{average total assets}}$

Return on Equity: Another measure focuses on the return on the firm's equity:

Return on equity = $\frac{\text{Net income minus preferred dividends}}{\text{average common shareholders' equity}}$

The Key Financial Ratio Reporting and Analysis area of analysis 328 assists with the following functions 905:

Multi-dimensional key ratio analysis across legal and financial management entities:
including leverage ratios, liquidity ratios, and profitability or efficiency ratios;
Variance analysis of actual ratios to budget values; and
Define exceptions in ratio calculation methods through use of e-Application Multipliers.

Sample key financial ratios include 906:

Current Ratio;
Quick Ratio;
Inventory Turnover;
Fixed Asset Turnover;
Total Asset Turnover;
Debt to Asset;
Time Interest Earned;
Profit Margin;
Basic Earning Ratio;
Return on Assets; and
Return on Equity.

Operational Reporting and Analysis

Analysis by Legal Entity

A corporation may consist of a number of companies or "legal entities" with each company having its own GL and chart of accounts. The GL Analysis 303 of the BPM Model 102 may provide a convenient set of various reports filtered by legal entity. This provides management with a set of financial statements focussed on a specific company thereby facilitating analysis:

- 'Income Statement Trends' shows a high-level income statement by company. Columns compare time periods, rows show values for each statement group.
- 'Balance Sheet Trends' shows a high level balance sheet grouped by company. Columns compare time periods. Rows show values for each statement group.
- 'Cash Flow Trends' presents a detailed cash flow statement grouped by company. Columns compare time periods. Rows show values for each statement group.
- 'Ratio Trends' displays a detailed analysis of key performance ratios grouped by company. Columns compare time periods. Rows show percentages or numeric values depending on the specific indicator.

Analysis by Management Entity

A management entity can be made up of a set of GL accounts. GL transactions in an account may belong to different management entities. Executive management often needs to compare the performance between entities in order to establish strategies and priorities:

- 'Profit Center Comparisons' presents a high-level income statement and gives a separate set of percentages for each profit center group. Columns compare time periods and rows show percentages of totals for each profit center group.
- 'Profit Center Rankings' show all lowest level categories for the profit center hierarchy and ranks profit centers for all fiscal periods by profit amount.
- 'Cost Comparisons' gives a separate set of percentages for each cost center group presented in a high-level income statement. Columns compare time periods, and rows show percentages of totals for each cost center group.
- 'Cost Center Rankings' show all lowest level categories of the cost center hierarchy. Cost centers are ranked by expense totals for a selected time period.

- 'Company Comparisons' show a high level income statement where each company is a column in the report and rows represent account groups.
- 'Company Rankings' ranks all companies, at the lowest level of categories of the company hierarchy, by amount of profit for a selected time period.

It is desirable that a manager of a profit or cost center may be able to view only the GL transactions that are applicable to his/her management entity. The GL Analysis 303 of the BPM Model 102 provides a set of reports and analysis cubes filtered in that way:

- 'Cost Center Analysis' shows a detailed income statement that includes account groups, detailed accounts, debits, credits, final balance.
- 'Account Analysis' displays a list of all transactions for the accounting period for a particular account. Columns include debit, credit, final balance.

Trial Balance

One of the most time consuming processes performed by the financial organization is that of the "period end close". The GL Analysis 303 of the BPM Model 102 may significantly reduce this time by providing easy access to detailed transaction information in a trial balance format. The 'Trial Balance' shows a list of all accounts sorted by account number including starting balance, debits, credits, and final balance. This report may be generated quickly and provides full drill down to the transaction level detail.

GL

'GL' displays a list of various detailed transactions for the accounting period for each account as selected in initial prompt filters such as document/transaction number. The GL report presents transaction description, credit, debit, and final balance information.

The Operational Performance and Analysis area of analysis 329 assists with the following functions 907:

Apply financial data to analyze the organization's past performance and assess its

current financial standing;

Compare corporate financial performance to industry benchmarks; and

Support development of short and long-term plans with the depth and flexibility of financial analysis information (detail and summary level).

Sample operational performance analysis KPIs include 908:

Transaction counts; and

GL account transaction level detail.

AP Analysis

AP Analysis 304 of the BPM Model 102 helps analyze raw AP sub-ledger transaction level data to manage a corporate asset. The AP Analysis 304 of the BPM Model 102 restructures AP data into the measurable facts used for strategic planning, program management and execution, and AP performance monitoring and reporting. Companies may select from a host of key performance metrics and decision-ready reports that enable them to continuously analyze the effectiveness of their AP function, performance of existing resources, and enhance understanding of the existing vendor base.

Thriving in any dynamic industry includes embracing e-business and using web-enabled technology to create, manage, and deliver analytical information. These are some of the activities that may be accomplished quickly with AP Analysis 304 of the BPM Model 102:

- Effective management of the AP function through close monitoring for AP effectiveness;
- Tight cash outflow management and analysis to enable projections for use in cash flow planning;
- Present overview of AP accounts for the purpose of evaluating the relationship with vendors;
- Evaluate functional transaction volumes and the impact on AP performance;
- Assess analyst performance as it relates to accounts that he manages; and
- Vendor profile performance.

Information Requirements within the AP Organization

AP organizations should have certain important information to be able to perform sound analysis for key decision-making. AP Analysis 304 of the BPM Model 102 offers AP organizations a set of KPIs along with many vital reports that support various management levels within the company. The AP Analysis 304 of the BPM Model 102 enables the AP organization to perform its functions and duties with tighter control over the cash outflow, better vendor relationship management, and more efficiently.

One goal or aim of the AP organization is to ensure all vendors are paid the full and the right amount in the "right" time taking into consider both the vendor and the company's perspectives. To achieve this goal AP organizations should:

- Manage cash outflow tightly, while balancing between best interests of the company versus the relationship with the vendor;
- Improve the AP process and management;
- Improve the relationship with Vendors in general and from the AP through full information and comprehensive analysis;
- Support related corporate functions: Inventory, Procurement, Treasury and Controlling; and
- Effectively manage the payment process with the minimum rate of errors.

Managers within the AP function should have a detailed understanding of AP organizational performance. They should have access to information that provides answers to questions on throughput, accuracy, timeliness and efficiency. AP Managers should know:

- If the AP organization is meeting it's obligations toward its vendors by paying them the right amount;
- Vendor profiles - which vendor's invoices are problematic, and which are not;
- What is the expected cash outflow - how much cash do we expect to pay out in the future, and when do we have to pay it? and
- How effectively is the organization performing with the given resources? What is the correlation of these resources to error rate?

AP Analysis 304 of the BPM Model 102 delivers information used to answer these questions, with the depth of analysis built on industry best practices needed by managers at various levels of the organization, including:

- High-level executive and senior managers who conduct strategic analysis on how the company is paying vendors, managing functional performance and determining cash outflow for planning; and
- AP analysts responsible for managing and monitoring vendors accounts and payment trends, and handling adjustments and making sure to execute the payment policies determined by the company.

AP Analysis 304 of the BPM Model 102 puts into its consideration the different types of reports and analyses that an AP manager would employ to evaluate:

- How effectively AP has been in meeting its functional objectives, and why these performance levels are being achieved;
- How effectively resources are being used to achieve these results; and
- How key information supports cross-functional analysis as it relates the vendor and financial analysis.

AP Analysis 304 of the BPM Model 102 delivers information for AP to:

- Ensure timely account payment and optimize AP cash outflow;
- Support strong vendor relations;
- Reduce operating costs;
- Improve the AP process and management; and
- Support related functions - procurement and inventory, finance (general ledger) and control.

Figure 10 shows an example of the AP Functional Area 304. The AP Analysis Functional Area 304 includes the following Areas of Analysis:

AP Vendor Profile 330;
AP Functional Performance 331;
AP Cash Outflow Forecast 332; and
AP Organizational Effectiveness 333.

The AP Analysis Functional Area 304 can use the Company Consolidation 346, Cost Center 348, Business Area 349, and Chart of Accounts 351 dimensions of the Organizational Dimensions for Financial Analysis; the Accounting Document Class 352 dimension of the Functional Document Dimensions 308; the Vendor 361 and Employee 365 dimensions of the Master Dimensions 309; the Organization 366 dimension of the Operational Entity Dimensions; the AP Activity Document 373 dimension of the Financial Transaction Activity Dimensions 311; and the All Time (Time, Fiscal) 374, Financial Currency Conversion 376, and User Category 378 dimensions of the Universal Dimensions 312. The relationship between the functional area and the dimensions are shown by way of connecting lines 314.

Vendor Profiling

AP provides information about payment history for a vendor or a group of vendor; this fact is incorporated in the design of the AP Analysis 304 of the BPM Model 102. The organization should understand in general terms how vendors have been delivering and dealing with the organization. However AP, in specific, should understand the financial aspect of the relation ship with the vendor. For example, what is the cost is to pay a certain vendor versus the rest, what is the trend of the terms the vendor is offering based on the volume of purchases and previous history, and which vendor has the highest number of inaccurate invoices and hence consume more than the average time to be paid. This type of information not only gives additional insight to other functions within the organization, but it also serves as a basis for vendor evaluation, and cash outflow forecasting.

Managers and analysts of the AP function should understand the current Vendor Information, as well as profiling vendor and vendor groups - not only where they are today, but how this has changed over time. Information about vendors is not merely a product of AP, but Procurement and Inventory organizations complete the whole picture about vendors. The 3-way check and vendor scorecard are two areas of analysis that involve the vendor profiling from the AP perspectives.

Sharing with vendors their profiles could improve the mutual communication and hence the relationship with vendors. Certain reports in AP Analysis 304 of the BPM Model 102 may target this issue of sharing knowledge between the corporate and the vendor aiming to more the vendor-customer relationship to partnerships.

A Vendor Profile 330 will allow managers and analysts to answer questions such as:

- What is the current balance for a vendor account? What are the transactions that define the current balance (including invoices, payments and adjustments)?
- Does the vendor offer the company discounts? What percent of discounts offered are taken? What is the dollar value?
- What is the cost to pay Vendors? (including errors, method of payments, adjustments)
- Which vendors are problematic and why?
- What is the profile of the vendor base?
- How does the vendor rank against others? (trading volume, discounts offered, adjustments, prices and fluctuations associated, and cost to pay)

The AP Vendor Profile area of analysis 330 assists with the following functions 1001:

Comparative analysis of payments patterns across vendors and vendor groups:
rank base on percent of dollars and transactions (current, past due);
Analyze payment performance history by vendor; prioritize outgoing payments;
Identify optimal conditions for taking discounts offered;
Assess vendor related transactions: number of cheques to invoices, adjustments; and
Monitor vendor specific aging schedule and account balance details.

Sample AP vendor profile KPIs include 1002:

Vendor aging schedule;
Vendor average days to pay;
Percentage and total of transactions and dollars past due; and
Vendor AP Profiles.

<u>AP Functional Performance</u>

The AP team is the designated division of the company that undertake the responsibility of ensuring that the organization is paying what is due, when it is due to its vendors. Any deviations from this expectation should be assessed and addressed by analysts and managers as required. To measure how effectively the function is performing, KPIs are monitored over time, across organizations, and compared to industry standards.

AP Analysis 304 of the BPM Model 102 delivers metrics and analysis measuring the functional performance of the AP function. The information provided helps answer questions such as:

- What money is owed this period? What percentage of dollars is past due?
- How quickly is the organization paying? How does this relate to particular analysts?
- What percentages of accounts are not meeting terms? What is the value of overdue accounts?
- How has the AP function evolved over time in its ability to pay on time and utilize discounts available?
- What is the average number of transactions that are processed by the AP department within a period? How has this changed overtime? How many adjustments took place?
- How has the AP function evolved over time in its ability to pay on time and maximize discounts?

The AP Functional Performance area of analysis 331 assists with the following functions 1003:

Evaluate effectiveness of the AP function in paying creditors for outstanding items within terms;

Monitor organization aging schedule;

Manage future outgoing payments based on size and number of payable; ensure sufficient funds available when needed;

Analyze average payment period, and track how performance has changed over time;

Analyze AP effectiveness in capitalizing on discounts; and

Assess AP accuracy in payments to vendors.

Sample AP functional performance KPIs include 1004:

Average days to pay;

Aging Schedule;

Average Days Past Due;

Total dollars / % past due; and

% payments on time vs. past due.

AP Cash Outflow Forecasts

AP and AR have a role in providing the treasury department with information to manage the cash most effectively and carry the function of planning. AR ensures that there is sufficient cash available in the future to cover AP for purchases, expenses, financing and operations. Furthermore, AP is responsible to provide the cash outflow forecast information to the treasury department. AP provides key information that can provide forecasts of cash outflow based on existing invoices and their related terms of payment and the trends reflecting the discounts taken.

AP Analysis 304 of the BPM Model 102 provides powerful forecasts of cash outflows based on three scenarios:

- Expected cash outflow based on the assumption that no accounts take advantage of discount payment terms;
- Expected cash outflow based on the assumption that all accounts take advantage of discount payment terms; and
- Expected cash outflow based on the expected days to pay for each account based on an analysis of their utilized discount taking patterns to date.

These cash outflow forecasts provide the Treasury function with the information they use to estimate the cash outflow required from the company, which, when compared with cash inflow analysis delivered in AR Analysis 304 of the BPM Model 102, provides valuable insight for cash flow planning which may be used by the treasury department.

The AP Cash Outflow Forecast area of analysis 332 assists with the following functions 1005:

Project future AP Cash Outflow based on current open items and payments terms;

Analyze expected outgoing cash into the future by day, based on three scenarios:

- amount due if no vendor terms are taken,
- amount due if all available discounts are taken, and
- amount due based on analysis of average days to pay vendors; and

Combine with AR Cash Inflow analysis for AR-AP Cash flow Analysis.

Sample AP cash inflow KPIs include 1006:

Payables dollars and item counts due into the future by day; and

Three scenario evaluation: no discounts, all discounts, and average days to pay.

The AP function is tasked with paying outstanding debt to vendors, employees and other parties to which the company owes money. AP role is to ensure that the debts are paid on time (whether or not discounts are taken), but no sooner than necessary. The ultimate goal is to maximize cashflow while supporting positive relationships with vendors, and other creditors.

AP Organizational Effectiveness

AP, like any other any department within an organization, should manage its account base as efficiently as possible - this relates both to the best use of resources and budget.

Inefficiencies in the AP process could result in increased cost to pay vendors, errors due to poorly distributed workload, and vendor dissatisfaction from transacting through poorly designed processes. An understanding of the AP function can provide a view of where non-value-adding steps can be eliminated and how to best utilize the cash available to pay the important bills first.

AP Analysis 304 of the BPM Model 102 delivers robust analysis of how AP resources are performing in working to achieve functional objectives. Managers will have the information to answer questions that include:

- How has account distribution across analysts changed as business has increased? How does this distribution compare based on total number of accounts, and total dollars managed?
- On average, how long does it take for a decision to be made on an invoice submitted for approval and payment?
- What was the total cost/savings for being in variance as related to payment terms?
- What is the average /Weighted average Days past due?
- What is the average AP payment period for a vendor? How does this compare across vendors? How has this changed over time?
- What proportion of $ value of open AP items in a period are dimensiond to the $ value of new transactions? How has this changed over time?
- How has the total number of transactions being processed by the AP department changed over time? Do increases in processed transaction per employee impact AP key performance indicators?

The AP Organizational Effectiveness area of analysis 333 assists with the following functions 1007:

Evaluate effectiveness of AP analysts/clerks and contribution to functional performance;

Monitor trends in new and open transaction volumes by type;

Assess distribution of workload across existing resources (analysts and clerks) as it relates to support in achieving AP objectives; and

Evaluate process effectiveness (time to clear open items), error in payments.

Sample AP organizational effectiveness KPIs include 1008:

New to Open transaction counts, values and ratio;

Average time to payopen items;

Number and value of duplicate payments; and

Number of transactions processed by employee.

As has been illustrated, AP Analysis 304 of the BPM Model 102 delivers information used by management to effectively analyze the performance of an organization's AP function. The AP process may also provide important information used in analysis by other functions that include:

- Procurement;
- GL: As a sub-ledger of the GL, AP provides the details necessary to explain changes in GL AP line items; and
- Treasury: The combination of AR cash inflow projections and AP cash outflow projections provide treasury with the information needed to plan cash flow.

The use of conforming dimensions (ex. vendors, chart of accounts, organization, etc.) ensure that while the reporting within each functional area as delivered by the BPM Model 102 (including Procurement 306, AP Analysis 304, GL Analysis 303, AR Analysis 302, Inventory Analysis 305, Sales Analysis 301) is robust, they also provide the ability to report across applications. The design for integration across the BPM Model 102 allows for a view of information across functions - hence ensuring that AP information is available to complete the analysis used in other functions within the organization.

Inventory Analysis

To remain competitive, organizations should be positioned to give their customers "what they want, how they want it and when they want it". This involves an understanding of how the supply chain is geared to meet demand - with inventory managers faced with delivering while maintaining the optimal balance between supply and demand.

For Inventory Management to effectively address the issues of product availability and meeting internal and external demand, they should have facts. They should know what they have, where it is, how much is invested in stock, and how effective the company has been in meeting the demand.

Inventory Analysis 305 of the BPM Model 102 delivers value to managers by helping turn raw data into information used to take action. Inventory Analysis 305 of the BPM Model

102 provides a host of key performance metrics and decision-ready reports that enable companies to analyze forecast accuracy, stock levels and valuations, stock fluctuations (e.g., minimum and maximum stock levels, stock outs), and key inventory analytics (e.g., ***ABC analysis***, inventory turns, and stock coverage).

These are just some of the activities that may be accomplished quickly with Inventory Analysis 305 of the BPM Model 102:

- Increase customer satisfaction through meeting demand;
- Better understand the investment in inventory and identify opportunities to improve cashflow;
- Improve forecasts and budgets; and
- Analyze warehouse performance, material classes, movements, forecasts, physical inventory, etc.

To be competitive in today's marketplace, organizations are realizing that they not only should embrace the power of e-commerce, but they should look beyond to c-commerce (collaborative commerce). c-Commerce identifies the benefit to sharing information with key partners and suppliers. It identifies the benefit for organizations to leverage the experience and insight of their channels to better understand the supply chain - and gain and sustain competitive advantage.

Through the sharing of insightful information into the Inventory Management function - measures such as stock level fluctuation, consumption, and inventory movement (issues and receipts), can return valuable input towards better understanding of how effectively product is moving through the organization process chain from supplier to the customer, while adding value along the way.

This understanding will empower the inventory managers to better plan and forecast stock requirements, while identifying opportunities to minimize excess stock levels and eliminating the related carrying costs that can reach, for example, upwards of 30%.

Inventory Analysis 305 of the BPM Model 102 enables the Inventory function to meet both functional and organizational goals, by sharing key inventory information such as:

- Material consumption and inventory level trends across the organization for items related to a specific vendor;
- The distribution of specific materials or material groups across warehouses/regions;
- The number of returns to vendors of specific materials and how it relates to total inventory held on the item;
- Consignment stock of inventory on site from a vendor and information on how consignment levels correspond to consumption; and
- Other valuable information which will bring the company and its key partners and suppliers closer together and ultimately improve the supply chain.

Inventory Analysis of the BPM Model 102 provides information for analysis and decision making at various management levels within a company's material management organization.

Some objectives of the inventory management function are to ensure that there is sufficient stock to meet the demand of internal (MRO (maintenance, repair and operations) and manufacturing) and external customers, manage the cost of owning inventory, forecast and plan for stock levels, and to identify opportunities for improved cashflow.

To accomplish these objectives, managers should have the information and analysis capable of providing an understanding of the investment made in inventory. This includes in-depth analysis of where money is being invested, how often it is being turned, who is driving the demand, and for what items. This should be tied to analysis on the effectiveness of this investment in meeting the demand, with a view from both a corporate level as well as from individual plants and warehouses. Inventory Analysis of the BPM Model 102 delivers key information used to analyze:

- Organizational investment in inventory;
- Functional effectiveness in managing and forecasting requirements;
- The movement of inventory through the organization;

- The allocation of resources; and
- How effective the organization has been in satisfying the demand of internal and external customers.

Managers should understand how the combination of all these variables impact their ability to meet the inventory policy and strategy - and ultimately how effective current plans and processes are in contributing to the corporate mission aimed at returning the greatest value to its stakeholders.

Inventory Analysis 305 of the BPM Model 102 delivers robust in-depth reporting and analysis to answer the questions that deal with:

- Management of inventory;
- Inventory consumption and demand;
- Operational performance; and
- Inventory control and forecast accuracy.

Inventory Analysis 305 of the BPM Model 102 delivers information used to answer these questions, with the depth and breadth of content to meet the needs of managers at various levels of the organization, including:

- High-level executive and senior managers who conduct strategic analysis into the investment in inventory, as well as how inventory strategies and forecasts have impacted cross-organizational performance;
- Inventory managers who require tactical reporting and analysis targeted at understanding the effectiveness of plans, distribution of investment across material segments, plant and warehouse locations; and
- Operational managers who oversee reporting (i.e., warehouse manager evaluation of inventory levels, values, turns and coverage for her specific location) and process effectiveness.

Inventory Analysis 305 of the BPM Model 102 offers inventory managers a robust source of information used for the effective management of stock, process and enhanced planning

and forecasting. Inventory Analysis 305 of the BPM Model 102 provides information used to understand:

- What is invested in stock;
- How effective the company is managing and forecasting requirements;
- How stock moves through the organization;
- How resources are being allocated; and
- How effective the company has been in satisfying the demand of both internal and external customers.

Figure 11 shows an example of the Inventory Analysis Functional Area 305. The Inventory Analysis Functional Area 305 includes the following Areas of Analysis:

Stock Overview and Valuation Analysis 334;
Material Movement Activity Analysis 335;
Demand Analysis 336;
Material Reservations Analysis 337;
Physical Inventory Analysis 338; and
Inventory Forecasts 339.

The Inventory Analysis Functional Area 305 can use the Business Area 349 dimension of the Organizational Dimensions for Financial Analysis 307; the Material Movement Document Class 355 dimension of the Functional Document Dimensions 308; the Vendor 361 and Material 362 dimensions of the Master Dimensions 309; the Valuation 384, Batch 385, and Stock Class 386 dimensions of the Functional Specific Dimensions 313; the Plant 367, Material Storage 368, and Storage Bin 369 dimensions of the Operational Entity Dimensions 310; and the All Time (Time, Fiscal) 374, Unit of Measure 375, Unit of Measure Conversion 377, and User Category 378 of the Universal Dimensions 312. The relationship between the functional area and the dimensions are shown by way of connecting lines 314.

Stock Overview and Valuation Analysis

Fundamental questions that inventory managers ask are, "What do we carry in inventory? What is worth? and Where is it?." To effectively answer these questions, managers should

know how inventory is being managed by the organization and how the investment is spread across the company. They not only should know the inventory profile of specific warehouses, but also how these profiles compare across the organization.

Inventory managers also should know where the investment is. They should have the power to analyze investment from many directions at various levels of detail. Key analysis including ABC, inventory turnover, and inventory coverage are critical - and deliver the greatest value when viewed from these various levels of detail and viewpoints.

Inventory Analysis 305 of the BPM Model 102 helps deliver rich detail on the inventory investment. It may provide the power of drilling from high-level to specific segments of materials, storage, stock types and status. The Inventory Analysis 305 of the BPM Model 102 addresses questions on stock overview and valuation analysis including:

- What has been our average corporate investment in stock this period? Where does the investment reside by warehouse? By stock location? How does this compare to the previous period? What has been the trend over time? How volatile is it over time?
- How much is invested in specific material groups? In raw materials? In finished goods? How has this changed over time?
- How do materials compare within an ABC analysis? Where are the "A" class materials being handled? How often are they turning?
- How many units of inventory are we holding for a specific material across the company? Across warehouses? By a specific plant? By storage location? How does this compare to the previous period? What has been the trend over time?
- What is the availability of the inventory? How much of the inventory is available for distribution? How much is in consignment? How much is restricted stock?
- What is the velocity of the inventory? Are certain materials fast moving or slow moving, or dead? How does this compare across warehouses? Within a specific warehouse?

- How often is the inventory turning by material groups? By material types? By specific materials? How does this compare to last period? Has it improved over time?
- What have the average inventory turns been for the company? What have the turns been by warehouse? Storage location? How does it compare to previous period? and what has been the trend over time?
- How many days of inventory do the company have by material? How does this look across the organization? What has been the trend over time? Has it been sufficient to meet demand or not enough?

The Stock Overview and Valuation Analysis area of analysis 334 assists with the following functions 1101:

Comparative analysis of summary and detail information on current inventory investment and from high-level to specific segments of materials, storage, stock types and status;

Analyze by materials hierarchies, ABC analysis, and by status (ex. restricted stock, in quality control, on consignment); and

Comparative analysis across plants and warehouses of inventory velocity, ability to meet demand, average stock and min-max stock levels.

Sample stock overview and valuation metrics include 1102:

Average stock level and value;

Minimum and maximum stock levels;

Inventory turns;

Stock level coverage;

Inventory stockouts; and

Zero-stock days.

Material Movement Activity

Another key area of analysis used by inventory managers is an understanding of the movement of inventory in, out, and within the organization. Material movements are the underlying building block of information within the Inventory Management function.

Understanding the nature and level of the activity of goods receipts, issues and transfers provides the additional detail on analysis around areas such as stock levels, shortages, resource allocation and the various process associated with the function.

Inventory Analysis 305 of the BPM Model 102 provides the summary level movement activity information used for effective analysis that may include drill down by type of movement, material segments, and warehouse. The inventory manager may also be provided with transaction level detail used to analyze trends identified from other inventory analysis performed within the application. The types of questions that may be addressed through material movement activity analysis include:

- How many movements have been processed this period? How do the movements breakout into goods receipts and issues? How does this compare to previous periods?
- What is the profile of goods receipt of inventory into the organization? How many receipts have been processed for specific materials or material segments? How many receipts have been processed for material from a specific vendor? What is the value of the receipts processed?
- How many receipts have been processed for specific warehouses/plants? For specific divisions? For specific business areas?
- Of the inventory received, what proportion were receipts into unrestricted inventory? Into quality control? Into other restricted statuses?
- How many goods issues were processed this period and how does it compare to previous?
- What materials were issued? How many issues were related to that material? What quantities were issues? To the material segment? How does this compare to previous periods?
- What types of issues have been processed? What proportion of materials have been issues to fulfil orders? Or issues to scrap?
- Who has been processing the receipts? What volumes of receipts have been processed by employees this period? What has been the trend over time?

- What has been the number of goods issues/receipts over the period? What is the average quantity moved? How does this compare across the organization? Across warehouses? How does this compare to the previous period?
- Provide a detailed analysis of stock movement in and out of inventory. Issues to order fulfilment, consignment or scrap? Receipts to quality control or unrestricted stock?
- Who has processed the issues? What shipping points have goods been issued from? How much inventory has been shipped this period? How does activity compare across shipping points this period? Over time?

The Material Movement Activity Analysis area of analysis 335 assists with the following functions 1103:

Analyze the nature and level of the activity of goods receipts, issues and transfers (down to individual movement types) - and how they relate to stock levels, shortages, resource allocation and the various process associated with the function;

Evaluate movement frequency and quanitities by product type and/or organization;

Analyze transaction volumes processed by inventory employees (ex. goods receipts); and

Provide a detailed analysis of stock movement in and out of inventory.

Sample material movement activity analysis KPIs include 1104:

Movement quantities; and

Movement values.

Demand Analysis

An objective of Inventory Management is to ensure that our customers get what has been promised. Understanding where the balance of inventory policy on supply (i.e., "what we have", "where it is" and "what it is worth") and the demand of internal and external customers ("did we deliver?") can maximize inventory performance. Moving closer to this balance will ensure that inventory management will continue to contribute to customer satisfaction while working towards improving corporate cashflow.

It is evident that management should know where the demand for inventory has come from, how inventory levels have changed, and whether the stock levels and fluctuations have allowed the organization to deliver. Inventory Analysis 305 of the BPM Model 102 delivers the depth of information used to assess inventory policy, and address questions that include:

- What types of goods issues have been processed this period? Have they been to fulfill sales orders? Were they issued to manufacturing? Were they issued for maintenance, repair or operations? How does this compare to the previous period? Has this changed over time?
- What materials have been issued? What specific material segments have been issued? How has this changed over time?
- What has been the stock levels for specific materials across the company this period? What have been the maximum levels of inventory reached? What has been the minimum stock level? Are these fluctuations within predefined limits? How does it compare across warehouses?
- Did any warehouses experience zero stock levels this period? How often did stock reach zero levels for a warehouse? For a material segment? For a specific material? How does this compare to previous periods? How does this compare to across materials and material segments?
- For materials that were at zero stock levels, how many days did they remain at zero stock?
- How many "stock outs" (defined as the inability to meet a request for inventory in a specific time frame) did the organization experience this period? Which warehouses had the most stock outs? Which storage locations? Do the stock outs relate to specific materials?
- For materials experiencing the most stock outs, what were the related zero stock counts and zero stock days?

The Demand Analysis area of analysis 336 assists with the following functions 1105:

Evaluate reason for internal movements of inventory

- whether goods issues for internal or external customers;

Analyze the type, volume and frequency of demand for Inventory customers: by

material type (raw material, MRO, fininshed goods) or specific material;

Assess inventories effectiveness in meeting demand of the all customers; and how this has evolved over time; and

Identify where demand has not been met and compare across materials and locations.

Sample demand analysis KPIs include 1106:

Transaction counts by customer;

Average transaction values by customer; and

Number of units issued by customer.

Material Reservations

Reservations serve to hold material within inventory for specific use either inside or outside the organization. The impact of the reservation is that while meeting a specific demand, they reduce the level of inventory available for use.

Analysis of material reservation activity provides inventory managers with additional insight into the demands for stock to fulfill internal and external customer requirements, and the ability to meet quantities requested.

Inventory Analysis 305 of the BPM Model 102 delivers valuable insight into reservation activity, trends and the ability to effectively meet requirements by answering questions, such as:

- How effectively have requirements for a specific material been met through confirmed stock this period? How does this pattern compare to specific material segments? How has this varied over time?
- What warehouses have been most successful in meeting requests for inventory in full? How do they rank? How has this changed over time? Has performance been within acceptable limits?
- How has confirmed reserved stock actually compared to actual stock withdrawn from inventory? Are there specific materials that often have less taken from

inventory than was actually reserved? Has this resulted in unnecessary excess stock? How does this impact the inventory policy?

- Are excess inventory reservations prevalent in specific warehouses? Or material segments?
- How much lead-time is there between the request for stock and the required date for the stock? How does this vary across the organization? How has this changed over time?

The Material Reservation Analysis area of analysis 337 assists with the following functions. 1107:

Analyze material reservation activity for insight into the demands for stock to fulfil internal and external customer requirements;

Evaluate the effectiveness of warehouses in meeting requests for inventory in full and how it compares to excess stock levels for specific materials or material segments;

Compare the activity across materials of confirmed reserved to actual stock withdrawn from inventory; and

Analyze lead-times and variations in request for stock to required date.

Sample material reservation analysis KPIs include 1108:

Reserved quantities;

Withdrawn quantities; and

Confirmed quantities.

Physical Inventory Analysis

A key to effectively managing inventory is having a keen view on whether "what we have" actually compares to "what we should have". Physical stock counts, regardless of method used, gives the manager an indication of how effectively or ineffectively stock levels are being managed. Inventory management should have the ability to identify exceptions in the gap between the physical and book values of inventory - and to analyze trends of where accuracy outside exception limits are occurring across the organization as a whole, across warehouses, by specific materials and material segments.

Inventory Analysis 305 of the BPM Model 102 delivers valuable analysis on physical inventory, by providing information used to understand this key point of control, including understanding questions such as:

- How accurate have the physical counts been across the organization this period? How accurate is the company in units? What is the percent accuracy? How does this compare to previous periods? Is it improving?
- How large have the shortages or overages been on average? Where have they occurred?
- How does physical count accuracy compare across warehouses? Across storage locations? Are there any locations that are performing outside corporate standards?
- Are shortages occurring within specific materials groups or materials? Have the shortages been consistent over-time, or is this a new trend?
- Are shortages specific to certain warehouses or storage locations?

The Physical Inventory Analysis area of analysis 338 assists with the following functions 1109:

Conduct comparative analysis of physical inventory accuracy across storage locations, and identify any trends as they relate to specific materials;

Evaluate physical inventory analysis within given storage areas (plant, warehouse to storage location) and identify sources of shortages or overages, and the related; quantities and dollar value; and

Analyze the areas where discrepancies occur most often; by material or material type, or location.

Sample physical inventory analysis KPIs include 1110:

Book stock level count;

Book stock group currency value; and

versus Actual stock level and group currency value.

Inventory Forecasts

One of the challenges facing inventory managers is how to forecast inventory requirements - particularly as the further one looks into the future, the less one can point with confidence to forecasts as part of the planning process. The more information that is available about the inventory function, the more effective and valuable forecasts become in working towards minimizing inventory while meeting demand. Part of this requires a view of how accurate inventory forecasts have been.

Inventory Analysis 305 of the BPM Model 102 addresses the requirements for insight into forecast accuracy, answering questions that include:

- What were the inventory forecasts for the organization this period? How does it compare to actual results? What is the variation? How does this compare to previous years?
- How accurate have forecasts been for a specific warehouse? For specific materials? For specific material segments? How accurate have forecasts been for "A" class materials?
- How have forecasts for specific items changed over time? How does it compare to the demand for those materials?

The Inventory Forecasts area of analysis 339 assists with the following functions 1111:

Analyze trends in forecasted levels across commodities over time;

Compare forecasted requirements to actuals inventory requirements across materials and locations; and

Analyze forecast accuracy across organizations, storage areas and material; evaluate how accuracy has evolved over time.

Sample inventory forecasts KPIs include 1112:

Forecast period value;

Corrected forecast values; and

Seasonal forecast index values.

Procurement Analysis

The procurement function has played a key role within the corporate environment. Controlling expenditures that can reach up to, for example, 65% of revenues, the effectiveness of the procurement function has a direct impact on its organization's bottom line, with each percentage point saved going directly towards profit.

Working hand-in-glove, the procurement and inventory management functions can ensure that there is enough material to meet the needs of internal and external customers - quality materials acquired for the right amount, from strategic suppliers, at the right price, available when needed.

The procurement function has evolved from transactional processing to the current day use for strategic purchasing as a core component of the corporate supply chain and competitive advantage. When a company's procurement function has moved beyond "price-driven purchasing" towards maximizing the corporate buying power through well developed relationships with strategic supply partners, they can experience improvements in product quality, dependable supply, competitive pricing, and process efficiencies.

For the purchasing function to effectively deliver on its objectives, one should understand where the money is being spent - and who it has been spent with. It should know where the opportunities exist for leveraging current buying power across the organization as well as how current suppliers have met expectations for quality and reliability. Purchasing management also should understand how effective the process has been in working towards achieving the functional performance objectives.

Procurement Analysis 306 of the BPM Model 102 delivers value to managers by turning raw data into the information used to take action. Procurement Analysis 306 of the BPM Model 102 provides a host of key performance metrics and decision-ready reports that enable users to analyze purchasing volumes and patterns across commodities, analyze performance of the buying organization, deliver vendor score-carding, review comparative vendor performance, and assess operational effectiveness.

Here are some of the that users may be able to accomplish quickly with the BPM Model 102 "business backbone" and Procurement Analysis 306 of the BPM Model 102:

- Maximizing buying effectiveness through realization of full leverage potential across commodities;
- Identify opportunities for development of strategic buying relationships;
- Increase customer satisfaction through meeting demand and delivery of quality product;
- Assess buying effectiveness of the purchasing organization down to the commodity and individual buyer;
- Recognize areas for improvement in the procurement cycle - from requirement identification through purchase order to receipt of inventory and invoice payment - ensuring timely availability of commodities when needed; and
- Analyze expenditures, commodities purchased, vendor performance, process effectiveness, buyer performance, and more.

To be competitive in today's marketplace, organizations are realizing that they not only should embrace the power of e-Commerce, but they should look beyond to c-Commerce (collaborative commerce). c-Commerce identifies the benefit to sharing information with the organization's key partners and suppliers. It identifies the benefit for organizations to leverage the experience and insight of their channels to better understand the supply chain - and gain and sustain competitive advantage.

A user's strategic suppliers have a unique view of the world - not only should they understand a user's business, but they also have a wider perspective of the user's enterprise in relation to competitors. They know what has been working, what is changing within the industry and how new processes are replacing the standard. Through the sharing of insightful information into the BPM Procurement function, a user's suppliers will be in a position to provide recommendations on purchasing policies, commodity substitutions, and process enhancements - all aimed at improving the efficiency of the supply chain, the effectiveness of buying practices and their role as a strategic partner. They will also benefit from an understanding of how their performance as the user's supplier is meeting expectations, and where they can focus on ensuring they maintain preferred supplier status.

Ultimately this empowers the Purchasing manager to better plan and forecast demand requirements, while identifying opportunities to benefit most from the organization's buying power, and eliminating inefficiencies in the process of acquiring the commodities needed to make the business run. This enables the Procurement organization to buy what is needed at the best price, while ensuring a stable supply, all done as efficiently as possible.

Procurement Analysis 306 of the BPM Model 102 (or EBI solution) enables purchasing to optimize and enhance the supplier relationship chain by allowing users to share key buying information such as:

- Corporate buying patterns and annual purchasing volumes by commodity;
- Commodity price analysis;
- Distribution of expenditures across the supplier base;
- Supplier performance including on-time delivery, product quality, full order fulfilment and price variation; and
- As well as other valuable information which will bring a user's company and a user's key partners and suppliers closer together and ultimately improve the supply chain.

Procurement Analysis 306 of the BPM Model 102 provides information for analysis and decision making at various management levels within a company's material management organization.

One objective of the procurement function is to secure a reliable supply of quality product to meet the material requirements of both internal and external customers – for example, at the lowest total cost of ownership. Effective purchasing organizations focus on sourcing from a consolidated buyer list to maximize corporate leverage, and adopting policies that automate repetitive processes. The realization of procurement's impact on supply chain management has placed focus on purchasing to understand the effects of the buying decision across all organizational processes - from inventory to manufacturing through sales and service.

To accomplish their objectives, purchasing managers should have information. They should know what is being bought, from where, for whom, for how much and how effectively. To ensure that the source of supply is secure - they also should know how reliable the supplier base is and who the strategic vendors are. Finally, these managers should ensure that the processes and policies that have been adopted are efficient in delivering the required supply, and this also requires the availability of key process information.

Managers should understand how the combination of all these variables impact their ability to meet the purchasing policy and strategy - and ultimately how effective current plans and processes are in contributing to the corporate mission aimed at returning the greatest value to its stakeholders.

Procurement Analysis 306 of the BPM Model 102 provides the comprehensive analysis used for:

- Ensuring timely availability of commodities when needed;
- Maximizing buying effectiveness through realization of full leverage potential across commodities;
- Identify opportunities for development of strategic buying relationships;
- Increase customer satisfaction through meeting demand and delivery of quality product;
- Assess buying effectiveness of the purchasing organization down to the commodity and individual buyer;
- Recognize areas for improvement in the procurement cycle; and
- Analyze expenditures, commodities purchased, vendor performance, buyer performance.

Procurement Analysis 306 of the BPM Model 102 delivers the robust in depth reporting and analysis used to answer the questions that deal with:

- The identification of commodity buying volumes and trends;
- Source list analysis;
- Pricing analysis;

- Vendor performance scorecarding and comparison; and
- Procurement cycle analysis.

Procurement Analysis 306 of the BPM Model 102 delivers information to answer these questions and with the depth and breadth of content to meet the needs of managers at various levels of the organization, which includes:

- High-level executive and senior management strategic analysis examining the performance of the corporate procurement function and effectiveness of the process in achieving functional objectives against baseline, current period and monitor changes over time;
- Purchasing managers require both strategic and tactical analysis targeted at understanding the effectiveness of plans, distribution of purchasing budget across commodities and vendors, and efficiency of the purchasing process and resources; and
- Buyer level commodity specific reporting for analysis of vendor and material purchasing volumes, vendor performance, and price analysis.

Procurement Analysis 306 of the BPM Model 102 offers purchasing managers a robust source of information for the effective management of the procurement process as it relates to commodities being sourced, supplier relationships, understanding internal demand, monitoring the efficiency of the process, and enhancing planning and forecasting.

Figure 12 shows an example of the Procurement Analysis 306. The Procurement Analysis Functional Area 306 includes the following Areas of Analysis:

Procurement Vendor Analysis 340;
Material Related Expenditure Profile 341;
Material Demand Analysis 342;
Procurement Process Effectiveness 343;
Procurement Organizational Effectiveness 344;
Bill of Material Analysis; and
e-Procurement Analysis.

The Procurement Analysis Functional Area 306 can use the Cost Center dimension 348 of the Organizational Dimensions for Financial Analysis 307; the Quotation Activity Document 356, Purchase Order Activity Documents 357, Requisition Activity Document 359, and Procurement Document Class 360 dimensions of the Functional Document Dimensions 308; the Vendor 361, Material 362, Customer 363, and Employee 365 dimensions of the Master Dimensions 309; the Organization 366 and Plant 367 dimensions of the Operational Entity Dimensions 310; the All Time (Time, Fiscal) 374, Financial Currency Conversion 376, and Unit of Measure Conversion 377 dimensions of the Universal Dimensions 312; and the Procurement Status 382 and Release Strategy 383 dimensions of the Functional Specific Dimensions 313. The relationship between the functional area and the dimensions are shown by way of connecting lines 314.

Procurement Vendor Profile (or Vendor Related Expenditure Profile)

As mentioned, for the purchasing function to deliver maximum value there should be an understanding of what has been bought (i.e., the commodity related purchasing profile). Similarly, another key area of analysis that is used by procurement professionals is that of answering the question "Who are we buying from?"

A characteristic of industry leaders with superior supply chains is the consolidation of source lists to single or sole source scenarios for particular key commodities - this ensures that organizations are maximizing or enhancing their buying power for specific or groups of materials with the supplier base.

Related is the fact that these key vendors are more than simple suppliers of materials - they are considered strategic partners of the organization. Strategic suppliers are those who have proven the ability to supply the products used within specifications at a competitive price, and are also in a position to deliver insight into the supply chain.

The purchasing function's understanding of "who" the budget is being spent with provides insight into:

- Who the company is doing business with;
- Where are there opportunities for source consolidation;

- Potential points for leveraging an organization's full buying power; and
- Subsequent efficiencies in the buying and release processes.

Vendor related expenditure profile information plays an important role within the purchasing function, and Procurement Analysis 306 of the BPM Model 102 delivers analysis to answer questions that include:

- Which vendors has the procurement organization purchased from this year? How many vendors does this include? How does it compare to last period? How has it changed over time?
- What commodities are purchased from a vendor? For a group of vendors? How many materials are purchased from a vendor? On average how much is spent per vendor in a specific period? What is the average volume purchased from a vendor?
- Which vendors does the company purchase the most from? How do vendors rank by volume and revenue spent? How does this compare to last period? How has this changed over time?
- How many vendors does the company have for a specific commodity or groups of commodities? What percentage of the volume for the commodity is sourced from multiple suppliers? How has this changed over time?
- How do prices compare across vendors for a specific commodity? How has this varied within the period? Across periods?
- What contracts are outstanding? What is total value of contracts with vendors in a year? Across vendors? What percentage of purchasing agreements are fulfilled within a period? How has this changed over time?
- What terms are offered by suppliers (ex. payment terms, deliver)? How do purchasing terms compare across vendors? How much has been spent with a particular vendor for additional charges to receive the good ordered (ex. Inco terms, FOB terms, transportation charges)?

The Procurement Vendor Profile area of analysis 340 assists with the following functions 1201:

Comparative evaluation of vendor related expenditure over time, ranked on annual

dollars spent and units purchased (commodity);

Profile vendors by specific material list, and by internal/external customers drivers; track price per unit changes;

Identify opportunities to consolidate vendor list to sole or single source; assess potential for redistribution of spend based on performance; and

Assess transaction history (summary and detail) by vendor and across vendors.

Sample procurement vendor profile KPIs include 1202:

Dollars spent with vendor, % of total dollars spent;

Units purchased, % change over time; and

Count of materials purchased from vendor.

Material (or Commodity) Related Expenditure Profile

A responsibility of the purchasing department is to buy product in sufficient supply to meet demand. However, it is no longer sufficient to simply fulfil orders as requested. To ensure that it continues to deliver maximum value to the organization, the procurement function should have a deeper understanding of "what is being bought". They should know what materials make up their material list and how they contribute to respective bill of materials, how each compares in volume and value, and where there are opportunities for consolidation or substitution.

This deeper level of understanding can take purchasing from a transaction processing function to one that works to improve the supply chain - and is considered a contributor to corporate competitive advantage. Once armed with the information which comes from multidimensional analysis, purchasing managers and buyers alike are in a position to identify opportunities for efficiencies in buying, and ultimately maximizing their organization's commodity specific buying power.

To effectively manage commodity related purchasing profiles, managers should have information that delivers a view of purchasing patterns by material from various viewpoints. Procurement Analysis 306 of the BPM Model 102 delivers this information, answering questions that include:

- What materials has the procurement organization purchased this period? In what volumes? What is the total value? What is the total landed cost of materials purchased? How does this compare to the previous period? How has this changed over time?
- How is the total landed cost of a commodity distributed across cost of the unit, transportation, tariffs and other carry costs? How has this changed over time?
- How has the procurement budget distributed across materials purchased in a period? How is it distributed across material groups or material types? How are materials distributed in an ABC analysis - which materials consume the largest proportion of our budget? Which materials consume the smallest portion of the budget? How does this compare over time?
- How many items are carried on the material list? Has this increased or increased over time? Are there opportunities for consolidation or substitution to maximize buying power?
- How have volumes ordered and prices changed over time for a given commodity? How has it changed across a material group? How has this changed over time?
- How are purchases of materials distributed across buyers? What percent of materials contribute to the volume being processed by a buyer? How do the volumes of materials purchased compare across buyers? Are there opportunities for consolidating the purchasing of materials across buyers?
- How have materials performed in the process? Which have been the most reliable? Which have been least reliable? How does quality compare across product? Across product groups? How has this evolved over time?

The Material Related Expenditure Profile area of analysis 341 assists with the following functions 1203:

Analyze total purchases and distribution of expenditures and volume;

Comparative evaluation of material related expenditure over time, rank on annual dollars spent and units purchased; assess distribution of single commodity purchases across vendors;

Profile material list; division of spend, source list, ABC analysis; monitor changes in

price, total landed costs, fluctuations in number of items carried; and

Assess transaction history (summary and detail) by materials and material types.

Sample material related expenditure profile analysis KPIs include 1204:

Number and value of units purchased; and

% of total material purchases.

Material (or Commodity) Demand Analysis

Before anything is bought, the purchasing department should understand what is required, when it is needed, and what the options are for meeting future demand of the internal customer. An understanding of whether requisitions are related to MRO functions, manufacturing jobs, or other types of order fulfilment, can impact the buyers strategy for sourcing the right product at the best price.

It is also useful for the purchasing professional to understand the demand patterns for specific commodities and the frequency and size of requests being submitted from internal customers.

Commodity demand analysis can provide the information used for effective planning of a purchasing strategy, managing current commodity requirements and optimizing the "buy" phase of the process. Procurement Analysis 306 of the BPM Model 102 addresses questions regarding demand analysis which include:

- What commodities have been requested by internal customers this period? How do these purchases translate into particular commodity groups? How does this compare to the previous period? How has it changed over time?
- What types of request have been processed by our purchasing organization (ex. MRO, manufacturing job orders, ***MRP***)? What is the volume of commodities or commodity groups processed by period for each type of request? Are there patterns that identify opportunities for efficiencies? How has this changed over time?

- What percent of the buying budget is spent on each respective demand channel to meet their material requirements? How does this compare to the previous period?
- How is each buyer's activity distributed across respective demand channels? Are there opportunities for redistribution of responsibility?
- Are there patterns of different demand channels ordering similar commodities? Does this present an opportunity to synchronize requirements across channels for consolidated buying? Are there opportunities for substituting materials internally to increase buying leverage?

The Material Demand Analysis area of analysis 342 assists with the following functions 1205:

Analyze commodities trends by internal customers, request types (MRO, job orders, MRP); evaluate material list- dollars spent and volumes purchases;

Evaluate the proportion of buying budget spent on each respective demand channel; and monitor changes over time; and

Assess buying patterns attributed to customers and identify opportunities for efficiencies in process; consolidate like demands to fewer vendors for increased buying leverage.

Sample material demand analysis KPIs include 1206:

Dollars spent and units purchased (as % of total) by cost centre; and

Transaction type counts and average value by cost centre.

Procurement Process Effectiveness

The efficiency of the procurement function can be a component of corporate effectiveness. Essentially, procurement is expected to source the goods used for the least investment in overhead. Hence, it is understood that to deliver maximum return through the purchasing cycle involves the elimination of non-value adding steps - which can range from streamlining the activities required to release a purchase order to the pattern observed in buying from particular vendors.

Procurement managers should have information that examines the steps in the purchasing process, the time required to move through the cycle and the efficiency within each phase of the cycle. Information that presents understanding of the process and opportunities for improvements translates into a decrease in the cost of acquiring the necessary materials, which in turn translates into increased profits.

The BPM Model 102 provides procurement managers with a cross-functional view of the process, used to identify opportunities for efficiencies, addressing the questions below. Part of the measurement of process effectiveness may analyze the time between activities and between organizational functions. Some of the questions listed below are cross-functional in nature, and are addressed in the BPM Model 102 with Inventory Analysis 305, Procurement Analysis 306 and AP Analysis 304:

- How many transactions are performed in a period for various stages in the procurement cycle? How do these volumes compare to the total level of purchases within a period? How many requisitions, contracts, purchase orders are processed across the organization? How do these relate to specific purchasing groups or buyers? How does this relate to specific commodities? What is the average value of each transaction? How does this compare to the previous period? How has this changed over time?
- How long does it take to move from one stage to the next in the procurement cycle? How long does it take to go from requisition to a purchase order? How does a release procedure impact the time to request a product? How do processing times relate to specific materials? To specific vendors? To specific buying groups? Where are the opportunities for reducing ordering lead time across commodities?
- What percentage of requisitions submitted are declined? What are the reasons for rejection? How does this compare across buyers? How does this compare across commodities? How does it compare across demand channels?

The Procurement Process Effectiveness area of analysis 343 assists with the following functions 1207:

Evaluate various stages of the procurement process; requisitions, vendor selection,

purchase orders and contracts(average dollars and units, transactions);

Identify opportunities to streamline purchasing process

- eliminating non-value adding steps;

Evaluate the efficiency of corporate release procedures in ensuring timely orders; and

Analyze time and efficiency in passing through purchasing cycle phases, and how it has changed over time

Sample procurement process effectiveness KPIs include 1208:

Average PO (purchase order) and contract values;

% of POs/Contracts used;

Days from Requisition to PO; average days by release procedure type; and

Ratio of Requisition to POs.

Procurement Organizational Effectiveness (or Vendor Scorecarding and Comparison)

Once an organization has determined what the material requirements are and which vendors will provide the supply, purchasing should ensure that the vendors who have been identified as strategic are performing within the acceptable standards. Reliable suppliers contribute to the overall performance of the supply chain, ensuring that an organization is able to meet the demand of its customers. Conversely, suppliers who are not delivering on their promises can cause inefficiencies due to poor product quality, delays in production, and/or price fluctuations.

To effectively evaluate vendor performance, purchasing management should monitor its strategic suppliers' ability to meet expectations in the areas of:

- Quality of product delivered;
- On-time delivery;
- Full deliveries of quantity ordered; and
- Price competitiveness, accuracy and fluctuations of commodities purchased.

These measures as part of a vendor scorecard provide procurement professionals with the measuring stick used to ensure that the current source list is meeting their obligations.

Suppliers who are successful in meeting these expectations are those who can be counted on to enhance the supply chain through their reliability, and their ultimate impact in lowering the total cost of ownership. Conversely, suppliers who are not performing would benefit from having access to performance information to allow for improvement. Alternatively, the organization can use the scorecard to identify where changes in the source list are required.

The BPM Model 102 delivers vendor performance scorecard analysis that may be used to evaluate specific suppliers or compare vendors across the organization, answering questions which include those below. Vendor evaluation as it applies to the procurement process may use input from across functional areas, which include purchasing, inventory management and AP. Most of the questions addressed below are cross-functional in nature, and are addressed in the BPM Model 102 in Inventory Analysis 305, Procurement Analysis 306 and AP Analysis 304:

- Has a vendor been successful in delivering orders on time? If not, what percentage of orders are typically late? On average how late are the orders? Are late orders commodity specific? How does this performance compare across vendors? Were late deliveries within expectations? What has the trend been over time?
- Of the deliveries received from a vendor, how many were delivered with inaccurate quantities? On average what was the discrepancy in quantities received from a vendor? How does this compare across commodities sourced from the vendor? How do vendors compare in their ability to deliver accurate quantities?
- What percentages of materials received from a vendor have met quality standards? How many units were returned at receipt? How many were rejected on the production line? How do returns compare as a percent of units received? How does this compare across vendors for a specific commodities? How does it compare for a vendor across all commodities sourced? How has this changed over time?

- How do prices compare for a commodity across vendors who supply the product? How have the prices changed over time? What was the percentage change of prices for the commodity over time?
- How effective have vendors been in invoicing materials at prices agreed upon on the purchase order? What percentages of invoices received contain inaccurate pricing or add-on charges and require correction? How does this compare across commodities provided by a vendor? How does this compare across vendors?

The Procurement Organizational Effectiveness area of analysis 344 assists with the following functions 1209:

Evaluate buying organization effectiveness; rank buyers by dollars, volume, percent of budget controlled, stability of price and source, and quality of vendor relationships managed;

Identify opportunities to consolidate buying from across buyers based on commodity or vendor-centricity; and

Analyze buyer performance and assess whether there is a requirement for redistribution of activities.

Sample organizational effectiveness analysis KPIs include 1210:

Total dollars per buyer control (as percent of total);

Count of materials per buyer (as % of total);

Total number of vendors per buyer; and

Transaction processed counts by employee (trend).

<u>e-Procurement Analysis</u>

The e-Procurement Analysis area of analysis 1211 assists with the following functions:

Analyze the activity level with e-procurement channels; monitor materials and material group purchases (units, $ volumes);

Comparative analysis of and purchasing trends between e-channels and traditional channels; analyze the proportion of purchases between channels and "channel convergence" over time;

Analyze process efficiency in e-channel and compare to traditional channel;

Assess which commodities are best suited for e-procurement channel;
Consolidate vendor purchase activity from across multiple channels; and
Evaluate success of migrating purchases from traditional to e-channel.

As has been illustrated, Procurement Analysis 306 of the BPM Model 102 delivers key information used by management to effectively analyze the performance of an organization's procurement function. However, the procurement cycle is cross-functional in nature.

The procurement process ranges from the receipt of material requirements to the issuance of requests for proposals and purchase orders, through to the receipt of goods and confirmation and payment of invoices. To truly understand the impact that procurement has on the organization's competitive advantage, this cross-functional view is used, which includes information from:

- Purchasing: The purchasing function provides the information used to analyze activities related with receipt of requirements (requisitions), maintaining a source list, managing contracts and issuing purchase orders. The purchasing function provides key information on the activity of vendors and commodities as they relate to the organization.
- Inventory Management: Inventory management works hand-in-glove with the purchasing function; both are tasked with ensuring there is sufficient supply of materials when they are needed. In particular, Inventory management provides the information used to evaluate vendor performance on measures relating to goods receipt – "How effective have the suppliers been in delivering what we asked for, of an acceptable level of quality, on time?"
- AP: AP provides information on the final stages of the procurement cycle, answering the question of what has the company been invoiced, and what has the company paid for materials purchased within the period. Like inventory management, AP provides key measures in assessing vendor performance. As part of the "three way verification" process (i.e., the check of prices and quantities across purchase orders, goods receipts and invoices), AP ensures that we are invoiced for what was received at the prices negotiated. The

effectiveness of the vendor meeting these requirements establishes the cost of doing business with a supplier in the purchasing cycle.

- Human Resources and Finance: As a measure of efficiency, Human Resources (HR) and Finance identify the resources used to perform the purchasing function. HR provides information on the "head count" used to perform the purchasing function for specified levels of buying activity. Ideally, the same head count should be able to process larger volumes of activity due to efficiencies and automation of the process. In a similar sense, Finance identifies the procurement related overhead costs that are incurred in meeting the demand for materials - the less the better. Overhead and head count measures are used for gauging the effectiveness of the purchasing function and its processes.

The BPM Model 102 through the use of confirming common dimensions (ex. vendor, materials, etc.) ensures that the reporting within each functional area as delivered by BPM Model 102 for Inventory Analysis, Procurement Analysis and Financial (general ledger) Analysis, are robust, while provide the ability to report across applications. The design for integration across the BPM Model 102 allows for a view of information across functions - hence ensuring that procurement professionals truly see the impact across the process.

e-Commerce Analysis

The Internet has given customers a new level of power and has blurred the differences between companies vying for their business. In the e-business world, a key to closing more deals, closing bigger deals, and closing them faster is to build strong customer relationships.

To do that, companies should have the right information, facts, and insight. They should spot top prospects and move quickly with solutions that hit the mark. They should have the power to analyze trends, avert bottlenecks, and put resources where they are required most.

e-Commerce Analysis of the BPM Model 102 helps turn raw data into increased sales. Companies can select from a host of key performance metrics and decision-ready reports

that enable them to analyze the who, what, when, where, why's of their e-commerce activity, and examine revenues and profitability.

Companies may evaluate the effect of buying incentives such as discounting to increase volumes, or induce cross-sell or up-sell behavior. They may identify or target new or repeat customers to identify trends and capitalize on opportunities, to increase revenues, minimize costs, and strengthen the e-commerce channel.

Thriving in an electronic marketplace involves embracing e-business and using technology to create, manage, and deliver analytical information. Here are some of the activities that users may accomplish quickly with e-Commerce Analysis of the BPM Model 102:

- Increase customer satisfaction and boost win rates;
- Better understand the buying habits of customers;
- Refine the way that the company interacts with customers;
- Improve forecasts and budgets; and
- Analyze customers, order types, product groups, etc.

Companies may use e-Commerce Analysis of the BPM Model 102 to:

- Provide the information used to make decisions that will keep customers, and generate more revenue;
- Adopt a profit-centric e-commerce model that aligns e-commerce goals with corporate goals;
- Develop more effective planning and forecasting with a big-picture view of the e-commerce function; and
- Analyse e-commerce performance from unlimited perspectives including customer demographics, shopping basket, product group, etc.

e-Commerce Analysis of the BPM Model 102 provides information for analysis and decision making at various management levels within a company's e-commerce and marketing organizations.

One objective of the e-commerce and marketing functions is to plan, execute, manage and monitor strategies and plans (ex. e-commerce strategies, campaigns, and product strategies and management), that are in alignment with the corporate mission and will return the greatest value to its stakeholders. This involves an understanding of how effective the e-commerce system has been in generating revenue, as well what has contributed to this performance. In their efforts to achieve these objectives, managers within the e-commerce and marketing functions should have a keen understanding of "how things are going" which begins with an analysis of the information being captured in the e-commerce process. e-Commerce Analysis of the BPM Model 102 delivers the information used to answer these questions, with the depth and breadth to meet the needs of managers at all levels of the organization:

- How the e-commerce system is contributing to revenues and profit margins;
- How product lines are performing;
- Who are their most valuable customers, what are their buying trends;
- How efficient the e-commerce process is in generating revenue;
- Strategic analysis examining how marketing and e-commerce strategies have impacted cross-organizational performance, monitor changes overtime to identify trends;
- e-Commerce product and marketing management tactical reporting and analysis targeted at understanding the effectiveness of plans designed to meet corporate objectives; and
- Operational reporting (ex. e-commerce customer buying profile) and process effectiveness.

e-Commerce Analysis of the BPM Model 102 addresses four main areas of analysis within an organizations e-commerce and marketing functions, aimed at assessing the effectiveness of the e-commerce cycle from the e-commerce order forward.

These areas of analysis include:

e-Commerce Performance;

Customer Profiling and Buying Trends;

Buying Trends; and

Product Performance.

e-Commerce Performance

A measure of corporate effectiveness in marketing its products and services is the question of "How much have we sold?"

Managers across the organization should know how revenue, volume and margin expectations are being met. They should know what parts of the organization are delivering on expectations, and how various geographies are performing. These requirements filter down to the e-commerce managers needing to know how they are doing? How their performance is meeting expectations today and over time.

e-Commerce Analysis of the BPM Model 102 delivers information for in depth analysis of e-commerce revenues, volumes and margin across the e-commerce product offering, addressing questions such as:

- How much has the company sold through the e-commerce site this period - revenue and volume? How does it compare to last period? What is the percent increase or decrease? What has been the trend over time?
- What geographies / markets have done well for the company? Where is the company loosing ground? Are the company's high revenue geographies / markets delivering on margin? Is the company seeing the percent growth necessary?
- What day of the week and time of day do the greatest / least number of sales occur?

Customer Profile and Buying Trends

Organizations should have a clear understanding of who their customer base is, what they want, and how their needs are being met.

The effectiveness of corporate e-commerce and marketing strategies, coupled with quality of product and service should translate into greater "share of customer"- which can be

measured by changes in the breadth of product purchased, the volume of products purchase, and changes in contribution to revenue and margin over time.

e-Commerce Analysis of the BPM Model 102 allows for analysis of customer trends and contribution, and changes in buying patterns by demographic or segment. e-Commerce systems capture a rich set of customer demographics such as age, gender, marital status, income, household size and number of children. These demographics provide the opportunity to develop an in-depth understanding of the customer base and the ability to closely examine who is buying what, when and how much. Examples of the types of questions that can be addressed include:

- How many customers are buying through e-commerce? How has this changed over time?
- What is the average revenue per customer? Which customer groups offer the highest total and average revenue contribution? Which groups are contributing most to volume? Most to margin? Have our average purchases per customer been increasing or decreasing over time? Have the number of products being purchased increased or decreased over time?
- Have revenues from a specific customer group been increasing over time - is this an indication of trend - an opportunity? Have the revenues for these groups decreased - and if so is it a product related, or pricing issue?
- Which customer demographic is driving sales? Is there a definite pattern? Is there an opportunity to target a specific customer profile?
- Who are the must active customers? Is there a link between a specific customer profile and those customers that are regular, repeat buyers? Is there a specific customer profile of those that the company is losing after the first purchase?
- Which customer demographic is driving specific product sales? What is the most popular product attribute by demographic? Is there an opportunity to cross-sell or up-sell customer s of a particular demographic?

Product e-Commerce Trends

Knowing the customers and what they want can open a window to view the effectiveness of the corporate product offering. A key component to developing market strategies and

product planning is an understanding of the market segments, how the current product offering addresses the customer requirements, and how this has evolved over time. e-Commerce management and their teams also should have analysis that allows them to assess the effectiveness of their operations and how products are contributing to achieving their goals within their markets.

e-Commerce Analysis of the BPM Model 102 delivers product analysis to answer the questions of both the e-commerce and marketing functions, which include:

- What product lines or specific products are we selling? How much revenue are they generating? How have these lines contributed to overall margin? How have these products performed to the previous period? and over time? What has been the rate of change? Which products are emerging as leaders? Which products are experiencing declining share?
- Where have the products been selling? Which geographies? Which customer groups? Rank to show the leading products.

Operational Effectiveness

The importance of a company's strong understanding of its customer base and the effectiveness of its product offering has been identified as key. However, if the organization is to deliver on its commitment to maximizing the value delivered to its shareholders, the e-commerce function should extend its contribution to the goal by evaluating the effectiveness of the e-commerce order taking process.

e-Commerce Analysis of the BPM Model 102 provides details on the process ranging from addressing questions on volumes of transactions being processed and various points in the chain to how are resources being allocated. Examples of the types of questions that can be addressed include:

- How many e-commerce orders are being processed per year?
- How does this volume relate to revenue?
- Has this been improving over time?

- What is the cost per sales order transaction of the e-commerce system and how does the cost per e-commerce transaction compare to traditional sales order transaction costs?

Data Model

The following will describe an embodiment of this invention using a star schema. It should be noted that this invention is not limited to a star schema data model.

Traditional stovepipe data warehouse applications, such as data marts, may serve certain departmental decision-making needs, but they fail to offer a variety of important enterprise-wide views. By incorporating common dimensions, the data model allows knowledge workers to share information across departments and gain important decision-making synergies. Based on common terms and common information, common dimensions ensure that users in relevant departments or functional areas approach business issues using the same references.

Figure 13 shows an embodiment of a Data Model 1300. In this embodiment, fact tables of Sales 1301 and Inventory 1302 share common dimensions tables Employee 1303, Material Product 1304, Unit of Measure 1305, Time 1306, Customer 1307, Promotion 1308, Vendor 1309, and Plant 1310. Connecting lines 1311 show the relationship between the fact tables and dimension tables.

Each component of the Data Model 1300 is designed from careful consideration of the business dimensions or measures that are common to each functional area of the business. Based on common terms and common information, these dimensions ensure that users in relevant departments approach business issues using the same references.

For example, the dimension "customer" means precisely the same thing to a sales manager as it does to an inventory warehouse manager or a finance vice president. Without conforming dimensions, each department would likely develop different definitions,

hierarchies, terms, and dimensions for many of the same business measures, an inefficiency that can sidetrack productivity and hamper decision-making.

Incorporating common dimensions means that IT builds the tables only once, and less redundancy because data is stored once, and shorter time to update because updated data is loaded once. Moreover, multiple star schemas can leverage the shared dimensions to reduce update time and resources. Updates occur once, not five times, which speeds the update process. In addition, common dimensions save disk space, reduce redundancy, and ensure that data is consistent from one mart to the next.

The BPM system data marts perform business performance management much faster than traditional ERP systems, which distribute data fields among thousands of tables. Finding the fields that describe a given query in an ERP system often requires joining copious tables, a time-consuming step that slows analysis and drains database processing power. Optimized for high-speed analysis and reporting, the BPM system incorporates a star schema architecture that accelerates query performance and produces fast business insight.

Star schema architectures contain two types of tables—fact tables and dimension tables. A fact table comprises the transaction history associated with each activity being modeled. These fact tables store the numerical measurements of the business and include an ID field for each dimension that they represent. For instance, a Sales fact table 1301 might include fields for Customer ID, Sales-person ID, Product ID, Quantity Sold, Discount, and Total Amount, etc. The fact table is linked to several dimension tables that qualitatively describe the fact table fields in more detail. For instance, the Salesperson ID dimension table might include Salesperson ID, Salesperson Name, Phone Number, Sales Office, and Employee Number, and so on.

This star structure, with the fact tables surrounded by satellite dimension tables, allows users to drill down quickly into the data to uncover correlations between dimensions and elements in the fact table. Forming queries involves a set of simple one-way joins, from the fact table to each dimension, rather than complex multi-step joins through multiple levels of

tables. Users get the information they need quickly, allowing them to solve business problems, spot trends, or act on opportunities.

Figure 14 shows an example of a Sales Analysis Schema comprising fact tables for Billing 1401, Sales Order 1402, and Distribution 1403; and satellite dimension tables for Time 1404, Unit of Measure 1405, Document Class 1406, Shipping Point 1407, Employee 1408, Sales Organization 1409, Customer 1410, and Product 1411. Connecting lines 1412 show the relationship between the fact tables and the dimension tables.

Figure 15 shows an example of a Financial Analysis Schema comprising fact tables for Account Activity 1501, Account Balance 1502, and Financial Transaction 1503; and satellite dimension tables for Time 1404, Business Area 1504, Financial Currency 1505, Fiscal 1506, Chart of Accounts 1507, Account Budget 1508, Budget Version 1509, Account Type 1510, Profit Center 1511, and Cost Center 1512. Connecting lines 1412 show the relationship between fact tables and the dimension tables.

Figure 16 shows an example of an Inventory Analysis Schema comprising fact tables for Material Movement 1601, Physical Inventory 1602, Material Reservation 1603, Stock Level Day 1604, Stock Level Week 1605, Stock Level Month 1606, and Stock Overview 1607; and satellite dimension tables for Time 1404, Business Area 1504, Valuation 1608, Stock Forecast Version 1609, Unit of Measure 1405, Batch 1610, Stock Class 1611, Material 1612, Storage Bin 1613, Material Storage 1614, and Plant 1615. Connecting lines 1412 show the relationship between fact tables and the dimension tables.

Figure 17 shows a Data Model 1700 which is an implementation of a BPM model. Figure 17 shows an embodiment of the Data Model as including the Procurement 1701, Inventory 1702, Sales 1703, GL 1704, AR 1705, and AP 1706 functional area data model components. The functional areas are associated with dimensions 1780. Figure 17 shows some examples of these associations by way of connecting lines 1781. Further details of associations of individual functional areas and dimensions are shown in Figures 18A to 18Y.

Procurement

The Procurement functional area 1701 data model component may include Procurement Activity Periodic Summary 1707, Requisition Activity Detail 1708, Quotation Activity Detail 1709, Purchase Order Activity Detail 1710, Contract Activity Detail 1711, and Contract Document Summary 1712 data structures.

The Procurement Activity Periodic Summary 1707 data structure may comprise:

- Open Entered Document Count
- Open Blocked Document Count
- Open Approved Document Count
- Completed Closed Document Count
- Completed Cancelled Document Count
- Total Document Open Days Count
- Remaining Document Dollar Amount
- Total Document Value
- Changed Date
- Created Date

The Requisition Activity Detail 1708 data structure may comprise:

- Group To Local Exchange Rate
- On Hold Quantity
- Open Quantity
- Received Quantity
- Relieved Quantity
- Requested Transaction Quantity
- Group Currency Estimated Unit Price Amt
- Group Currency Extended Price Amount
- Group Currency Other Expenses Amount
- Group Currency Total Landed Cost Amount
- Group Currency Tax Amount
- Group Currency Duty Amount
- Group Currency Freight Amount

- Touch Count
- Correction Count
- Adjustment Count
- Created Date
- Changed Date

The Quotation Activity Detail 1709 data structure may comprise:

- Transaction Quantity
- On Hold Quantity
- Open Quantity
- Received Quantity
- Relieved Quantity
- Group Currency Unit Price Amount
- Group Currency Extended Price Amount
- Group Currency Other Expenses Amount
- Group Currency Total Landed Cost Amount
- Group Currency Tax Amount
- Group Currency Duty Amount
- Group Currency Freight Amount
- Group To Local Exchange Rate
- Touch Count
- Correction Count
- Adjustment Count
- Created Date
- Changed Date

The Purchase order Activity Detail 1710 data structure may comprise:

- Transaction Quantity
- On Hold Quantity
- Open Quantity
- Received Quantity
- Relieved Quantity

- Group Currency Unit Price Amount
- Group Currency Extended Price Amount
- Group Currency Other Expenses Amount
- Group Currency Total Landed Cost Amount
- Group Currency Tax Amount
- Group Currency Duty Amount
- Group Currency Freight Amount
- Group To Local Exchange Rate
- Touch Count
- Correction Count
- Adjustment Count
- Created Date
- Changed Date

The Contract Activity Detail 1711 data structure may comprise:

- Transaction Quantity
- On Hold Quantity
- Open Quantity
- Relieved Quantity
- Cumulative Received Quantity
- Received Quantity
- Group Currency Unit Price Amount
- Group Currency Target Commitment Amount
- Group To Local Exchange Rate
- Touch Count
- Correction Count
- Adjustment Count
- Created Date
- Changed Date

The Contract Document Summary 1712 data structure may comprise:

- Total Contract Dollar Value

- Remaining Dollar Value
- Created Date
- Changed Date

Inventory

The Inventory functional area 1702 data model component may include Stock Usage Forecast 1713, Physical Inventory 1714, Material Reservation 1715, Stock Overview 1716, and Material movement 1721 data structures.

The Stock Usage Forecast 1713 data structure may comprise:

- Forecast First Day Date
- Modified Forecast First Day Date
- Forecast Period Number
- Forecast Value
- Corrected Value
- Seasonal Index Value
- Created Date
- Changed Date

The Physical Inventory 1714 data structure may comprise:

- Document Number
- Document Item Number
- Inventory Fiscal Year
- Book Stock Level Count
- Book Stock Document Cur Extndd Val Amt
- Book Stock Group Currency Extndd Val Amt
- Book Stock Local Currency Extndd Val Amt
- Physical Inventory Count
- Physical Inventory Grp Cur Extnd Val Amt
- Final Count Indicator
- Absolute Stock Accuracy Percentage
- Relative Stock Accuracy Percentage

- User Name
- # Last Count Date Sid

The Material Reservation 1715 data structure may comprise:

- # Document Number
- # Document Item Number
- Reservation Date
- Reserved Quantity
- Reserved Quantity Doc Cur Extndd Val Amt
- Reserved Quantity Grp Cur Extndd Val Amt
- Reserved Quantity Lcl Cur Extndd Val Amt
- Confirmed Quantity
- Withdrawn Quantity
- Confirmed Quantity Grp Cur Extnd Val Amt
- Withdrawn Quantity Grp Cur Extnd Val Amt
- Document Currency Code
- Document Currency Conversion Rate
- Group Currency Code
- Local Currency Code
- Local Currency Conversion Rate
- User Name
- Deletion Indicator
- Final Issue Indicator

The Stock Overview 1716 data structure may comprise:

- # Calendar Month
- Absolute Stock Accuracy Percentage
- Average Stock Level
- Average Unrestricted Stock Level
- Closing Stock Level
- Closing Unrestricted Stock Level
- Cumulative Usage Quantity

- Forecast Usage Quantity
- Last Used Date
- Maximum Stock Level
- Maximum Unrestricted Stock Level
- Minimum Stock Level
- Minimum Unrestricted Stock Level
- Moving Average Stock Level
- Moving Average Usage Quantity
- Moving Avg unrestricted Stock Level
- Opening Stock Level

The Material Movement 1721 data structure may comprise:

- Purchase Order Number
- Purchase Order Item Number
- Document Date
- Expiration Date
- Group Currency Value
- Movement Quantity
- Created Date
- Changed Date

Sales

The Sales functional area 1703 data model component may include Sales Distribution 1722, Billing 1723, and Sales Order 1724 data structures.

The Sales Distribution 1722 data structure may comprise:

- Actual Delivered Base Unit Quantity
- Actual Delivered Sale Unit Quantity
- Company Code
- Actual Goods Issue Date Sid
- # Changed Date
- Complete Delivery Indicator

- Created Date
- Delivered Date Sid
- Distribution Channel Code
- Document Currency Code
- Group To Document Currency Conversion Rt
- Document Currency Extended Cost Amount
- Document Currency Extended Net Price Amt
- Document Currency Extended Net Value Amt
- # Document Item Number
- # Document Number
- Document Type Code
- Group Currency Code
- Group Currency Extended Net Price Amount
- Group Currency Extended Net Value Amount
- Loaded Date Sid
- Local Currency Code
- Group to Local Currency Conversion Rate
- Local Currency Extended Net Price Amount
- Local Currency Extended Net Value Amount
- Next Planned Shipping Date Sid
- Order Combination Indicator
- Planned Goods Issue Date Sid
- Priority Delivery Code
- Requested Delivery Date Sid
- Scheduled Transportation Date Sid

The Billing 1723 data structure may comprise:

- Adjustment Identifier
- # Changed Date
- Created Date
- Customer Transaction Line Number
- Customer Transaction Number

- Document Currency Code
- Group to Document Currency Exchange Rate
- Document Currency Extended Cost Amount
- Document Currency Extended Price Amount
- Document Currency Cash Discount Amount
- Document Currency Freight Amount
- Document Currency Tax Amount
- # Document Item Number
- # Document Number
- Document Type Code
- Group Currency Code
- Group Currency Discount Amount
- Group Currency Extended Price Amount
- Group Currency Cash Discount Amount
- Group Currency Freight Amount
- Group Currency Profit Margin Amount
- Group Currency Tax Amount
- Local Currency Code
- Group to Local Currency Exchange Rate
- Local Currency Extended Price Amount
- Local Currency Cash Discount Amount
- Local Currency Freight Amount
- Local Currency Tax Amount

The Sales Order 1724 data structure may comprise:

- # Changed Date
- Created Date
- Document Currency Code
- Group To Document Currency Conversion Rt
- Document Currency Discount Amount
- Document Currency Extended Cost Amount
- Document Currency Extended Price Amount

- Document Currency Profit Margin Amount
- Document Currency Freight Amount
- Document Currency Tax Amount
- # Document Item Number
- # Document Number
- Document Type Code
- Group Currency Code
- Group Currency Discount Amount
- Group Currency Extended Cost Amount
- Group Currency Extended Price Amount
- Group Currency Freight Amount
- Group Currency Profit Margin Amount
- Group Currency Tax Amount
- Local Currency Code
- Group to Local Currency Conversion Rate
- Local to Document Currency Conversion Rt
- Local Currency Discount Amount
- Local Currency Extended Cost Amount
- Local Currency Extended Price Amount
- Local Currency Freight Amount
- Local Currency Profit Margin Amount

GL

The GL functional area 1704 data model component may include GL Activity Detail 1725, GL Balance 1726, and GL Budget 1727 data structures.

The GL Activity Detail 1725 data structure may comprise:

- Local Currency Amount
- Local Currency Credit Amount
- Local Currency Debit Amount
- Local Currency Net Amount
- Group Currency Credit Amount

- Group Currency Debit Amount
- Group Currency Net Amount
- Changed Date
- Created Date

The GL Balance 1726 data structure may comprise:

- Changed Date
- Created Date
- Group Currency Close Bal Amount
- Group Currency Period Credit Amount
- Group Currency Period Debit Amount
- Group Currency Period Net Activity Amt
- Group Currency Period Open Bal Amount
- Group Currency Year Open Bal Amount
- Group Currency YTD Credit Amount
- Group Currency YTD Debit Amount
- Group Currency YTD Net Activity Amount
- Local Currency Close Bal Amount
- Local Currency Period Credit Amount
- Local Currency Period Debit Amount
- Local Currency Period Net Activity Amt
- Local Currency Period Open Bal Amount
- Local Currency Year Open Bal Amount
- Local Currency YTD Credit Amount
- Local Currency YTD Debit Amount
- Local Currency YTD Net Activity Amount
- Year End Indicator

The GL Budget 1727 data structure may comprise:

- Changed Date
- Created Date
- Group Currency Close Bal Amount

- Group Currency Period Activity Amount
- Group Currency Period Open Bal Amount
- Group Currency Year Open Bal Amount
- Group Currency YTD Activity Amount
- Local Currency Close Bal Amount
- Local Currency Period Activity Amount
- Local Currency Period Open Bal Amount
- Local Currency Year Opening Bal Amount
- Local Currency YTD Activity Amount

AR

The AR functional area 1705 data model component may include AR Transactional Detail 1728, AR Daily Transaction Summary 1729, AR Monthly Transaction Summary 1730, and AR Monthly Account Summary 1731 data structures.

The AR Transactional Detail 1728 data structure may comprise:

- Debit Multiplier
- Credit Multiplier
- Local Currency Amount
- Local Currency Net Amount
- Local Currency Tax Amount
- Local Currency Discount Amount
- Local Currency Cost Amount
- Local Currency Freight Amount
- Local Currency Profit Margin Amount
- Group Currency Amount
- Group Currency Net Amount
- Group Currency Tax Amount
- Group Currency Discount Amount
- Group Currency Cost Amount
- Group Currency Freight Amount
- Group Currency Profit Margin Amount

- Created Date
- Changed Date

The AR Daily Transaction Summary 1729 data structure may comprise:

- Daily Open Transaction Count
- Daily New Transaction Count
- Daily Total Open Item Amount
- Daily Total New Item Amount
- Daily Total Transaction Amount
- Daily Total Gross Sales Revenue Amount
- Daily Total Net Sales Revenue Amount
- Daily Total Revenue Amount
- Daily Average Transaction Amount
- Daily Average Gross Sales Revenue Amount
- Daily Average Net Sales Revenue Amount
- Daily New To Open Amount Ratio
- Daily New To Open Count Ratio

The AR Monthly Transaction Summary 1730 data structure may comprise:

- Monthly Open Transaction Count
- Monthly New Transaction Count
- Monthly Discount Taken Transaction Count
- Monthly Discount Refused Transaction Count
- Monthly Total Transaction Amount
- Monthly Profit Amount
- Monthly Average Transaction Count
- Monthly Average Transaction Amount
- Monthly New to Open Transact Count Ratio
- Monthly New to Open Transac Amount Ratio
- Monthly Average Daily Sales Volume
- Monthly Average Collection Period
- Monthly Value Past Due Amount

- Monthly Trade Discount Cost Amount
- Monthly Effect on Bottom Line Amount
- Monthly Collection Effectiveness Index
- Dollar Weighted Avg Days Outstanding Amt
- Dollar Weighted Avg Days Beyond Term Amt
- Dollar Weighted Average Days to Pay Amt
- Monthly Net Credit Period
- Monthly AR Account Balance Amount
- Created Date
- Changed Date

The AR Monthly Account Summary 1731 data structure may comprise:

- Monthly Average Cost To Serve Amount
- Monthly Avg Invoice Payment Day Count
- Monthly Cost to Serve Amount
- Monthly Average Daily Sales Volume
- Monthly Average Collection Period
- Monthly Value Past Due Amount
- Monthly Trade Discount Cost Amount
- Monthly Effect on Bottom Line Amount
- Monthly Average Deliquent Day Count
- Monthly Collection Effectiveness Index
- Dollar Weighted Avg Days Outstanding Amt
- Dollar Weighted Avg Days Beyond Term Amt
- Dollar Weighted Average Days to Pay Amt
- Monthly AR Account Balance Amount

AP

The AP functional area 1706 data model component may include AP Activity Detail 1732, AP Monthly Activity Summary 1733, AP Monthly Account Summary 1734, and AP Daily Activity Summary 1735 data structures.

The AP Activity Detail 1732 data structure may comprise:

- Local Currency Amount
- Local Currency Net Amount
- Local Currency Tax Amount
- Local Currency Discount Taken Amount
- Local Currency Discount Allowed Amount
- Local Currency Freight Amount
- Group Currency Amount
- Group Currency Net Amount
- Group Currency Tax Amount
- Group Currency Discount Taken Amount
- Group Currency Discount Allowed Amount
- Group Currency Freight Amount
- Total Payment Days Count
- Payment Term Day Count
- Payment Discount Day Count
- Created Date
- Changed Date

The AP Monthly Activity Summary 1733 data structure may comprise:

- New Transaction Count
- Open Transaction Count
- Discount Taken Transaction Count
- Discount Refused Transaction Count
- New Transaction Amount
- Open Transaction Amount
- Discount Taken Amount
- Discount Available Amount
- Created Date
- Changed Date

The AP Monthly Account Summary 1734 data structure may comprise:

- AP Account Balance Amount
- Average Days Past Due Count
- Average Collection Period
- Bad Debt Amount
- Invoice Count
- Invoice Amount
- Payment Count
- Payment Amount
- Adjustment Count
- Adjustment Amount
- Best Possible DPI Ratio
- Bottom Line Effect Amount
- Payment Effectiveness Index
- Cost To Serve Amount
- Days of Purchases Instanding Ratio
- Net Credit Purchases Amount
- Past Due Amount
- Trade Discount Profit Amount
- Trade Discount Offered Amount
- Dollar Weighted Avg Days Beyond Term Amt
- Past Due Count
- Dollar Weighted Avg Days Outstanding Amt

The AP Daily Activity Summary 1735 data structure may comprise:

- Open Transaction Count
- New Transaction Count
- Discount Taken Transaction Count
- Discount Refused Transaction Count
- Discount Taken Amount
- Discount Available Amount
- Open Transaction Amount

- New Transaction Amount
- Total Gross Sales Revenue Amount
- Total Net Sales Revenue Amount
- Total Revenue Amount
- Past Due Amount
- Average Transaction amount
- Average Gross Sales Revenue Amount
- Average Net Sales Revenue Amount

Dimensions

Listed below are examples of Dimensions 1780, and their data structures, used in the Data Model. Other Dimensions may be added, such as Account Category Party, AR Daily Activity Summary, Bill of Material Usage, Billing Document, Financial Transaction Detail, GL Activity Document, Material Reservation Document, Physical Inventory, Purchasing Organization Group, Sales Distribution Document, Sales Document Class, Sales Lifecycle Status, Sales Order Document, Stock Level Day, Stock Level Month, Stock Level Week, and Stock Opening Balance.

Material 1736

Material Sid
- Base Unit Of Measure Code
- Changed Date
- Company Code
- Company Name
- Created Date
- Deletion Date
- Deletion Flag
- Dimension Unit of Measure Code
- Division Code
- Division Name
- GL Category Code
- GL Category Description
- Height

- Height Unit of Measure Code
- Industry Sector Code
- Industry Sector Description
- Inventory Cost Level Code
- Length
- Length Unit of Measure Code
- Level 1 Material Name
- Level 2 Material Name
- Level 3 Material Name
- Level 4 Material Name
- Level 5 Material Name
- Material Category Code
- Material Category Description
- Material Description
- Material Group Code
- Material Group Description
- Material Hierarchy Level Number
- Material Identifier
- Material Long Code
- Material Long Description
- Material Type Code
- Material Type Description
- Merchant Number
- Net Weight
- Order Unit of Measure Code
- Price Band Category Code
- Price Band Category Description
- Price Reference Material Id
- Sales Unit of Measure Amount
- Sales Unit of Measure Code

Unit of Measure Conversion 1737

- BASE UNIT OF MEASURE CODE

- BASE UOM TO SI CONSTANT VALUE
- BASE UOM TO SI DENOMINATOR VALUE
- BASE UOM TO SI EXPONENT VALUE
- BASE UOM TO SI NUMERATOR VALUE
- CHANGED DATE
- CONVERSION FACTOR
- CREATED DATE
- DIMENSION CODE
- DIMENSION TEXT
- DIVISOR
- FROM UNIT OF MEASURE CODE
- FROM UNIT OF MEASURE SID
- FROM UOM TO SI CONSTANT VALUE
- FROM UOM TO SI DENOMINATOR VALUE
- FROM UOM TO SI EXPONENT VALUE
- FROM UOM TO SI NUMERATOR VALUE
- MULTIPLIER
- TO BASE DIVISOR
- TO BASE FACTOR
- TO BASE MULTIPLIER
- TO UNIT OF MEASURE CODE
- TO UNIT OF MEASURE SID
- TO UOM TO SI CONSTANT VALUE
- TO UOM TO SI DENOMINATOR VALUE
- TO UOM TO SI EXPONENT VALUE
- TO UOM TO SI NUMERATOR VALUE

Unit of Measure 1738

Unit of Measure Sid
- Unit of Measure Code
- Unit of Measure Text
- Iso Code
- Iso Measurement Name
- Dimension Key
- Dimension Text
- Created Date
- Changed Date

Financial Currency Conversion 1739

From Currency Code
To Currency Code

- Fiscal Period Sid
- Fiscal Variant Code
- Fiscal Year Code
- Fiscal Year Value
- Posting Period Number
- Posting Period End Date
- Rate Published Date
- Base Currency Code
- Conversion Rate From To Base Currency
- Conversion Rate Base To From Currency
- Conversion Rate Base To Currency

All Time 1740

The All Time dimension may comprise the Time 1741 and Fiscal 1742 dimensions.

Time 1741

Time Sid
- Calendar Date
- Calendar Weekday
- Calendar Day
- Calendar Week
- Calendar Month
- Calendar Fiscal Period Number
- Calendar Year
- Calendar Quarter

Fiscal 1742

Fiscal Period Sid
- Fiscal Variant Code
- Fiscal Year Value
- Fiscal Quarter
- Posting Period Number
- Fiscal Date
- Posting Period Count

Employee 1743

- Changed Date
- Created Date
- Employee Category Code
- Employee Category Description
- Employee Subtype Code
- Employee Subtype Description
- Employee Type Code
- Employee Type Description
- Employment Start Date
- Employment End Date
- First Name
- Lock Indicator
- Middle Name or Initial

Personnel Number Sid

Organization 1744

- Fiscal Variant Code
- Organization Category Code
- Organization Category Description
- Organization Hierarchy Level Number
- Level 1 Organization Name
- Level 2 Organization Name
- Level 3 Organization Name
- Level 4 Organization Name
- Organization Type Code
- Organization Type Name
- Company Code
- Company Name
- Distribution Channel Code
- Distribution Channel Name

- Division Code
- Division Name
- Organization Identifier
- Organization Name
- # Organization Sid
- Sales Group

Customer 1745

- # Customer Sid
- Account Assignment Group
- Account Number
- Address Identifier
- Billing Block Code
- City Name
- Country Code
- Country Name
- County Code
- County Name
- Currency Code
- Customer Classification Code
- Customer Classification Name
- Customer Group Code
- Customer Group Name
- Customer Hierarchy Level Number
- Customer Merchant Number
- Customer Identifier
- Customer Long Name
- Customer Name

Business Area 1746

- # Business Area Sid
- Created Date

- Change Date
- Business Area Code
- Business Area Name
- Business Area Leaf Level Number
- Business Area Level 1 Code
- Business Area Level 1 Name
- Business Area Level 2 Code
- Business Area Level 2 Name
- Business Area Level 3 Code
- Business Area Level 3 Name
- Business Area Level 4 Code
- Business Area Level 4 Name
- Business Area Level 5 Code
- Business Area Level 5 Name
- Enabled Flag
- Valid From Date
- Valid To Date

Chart of Account 1747

Chart of Account Sid

- Chart of Account Name
- Account Identifier
- Chart Identifier
- Company Code
- Account Number
- Account Name
- Account Long Name
- Account Additional Text
- Account Category Type Code
- Account Category Type Name
- Account Currency Code
- Account Leaf Level Number

- Account Level 1 Identifier
- Account Level 1 Name
- Account Level 2 Identifier
- Account Level 2 Name
- Account Level 3 Identifier
- Account Level 3 Name
- Account Level 4 Identifier
- Account Level 4 Name
- Account Level 5 Identifier
- Account Level 5 Name
- Account Level 6 Identifier
- Account Level 6 Name
- Account Level 7 Identifier
- Account Level 7 Name
- Account Level 8 Identifier
- Account Level 8 Name
- Account Level 9 Identifier
- Account Level 9 Name
- Account Level 10 Identifier
- Account Level 10 Name
- Fiscal Year
- Financial Budget Item Identifier
- Blocked Flag
- Postable GL Account Flag
- Sign Reversal Multiplier
- Credit Account Multiplier
- Debit Account Multiplier
- Balance Sheet Multiplier

Release Strategy 1748

- CHANGED DATE
- CREATED DATE

- DOCUMENT TYPE NAME
- RELEASE STRATEGY APPROVAL MINIMUM 1 AMT
- RELEASE STRATEGY APPROVAL MINIMUM 2 AMT
- RELEASE STRATEGY APPROVAL MINIMUM 3 AMT
- RELEASE STRATEGY APPROVAL MINIMUM 4 AMT
- RELEASE STRATEGY APPROVAL MINIMUM 5 AMT
- RELEASE STRATEGY CODE
- RELEASE STRATEGY DESCRIPTION
- RELEASE STRATEGY DOCUMENT TYPE CODE
- RELEASE STRATEGY GROUP CODE
- RELEASE STRATEGY GROUP DESCRIPTION
- RELEASE STRATEGY PERSON RESPONSIBLE 1 NM
- RELEASE STRATEGY PERSON RESPONSIBLE 2 NM
- RELEASE STRATEGY PERSON RESPONSIBLE 3 NM
- RELEASE STRATEGY PERSON RESPONSIBLE 4 NM
- RELEASE STRATEGY PERSON RESPONSIBLE 5 NM
- RELEASE STRATEGY ROLE RESPONSIBLE 1 NAME
- RELEASE STRATEGY ROLE RESPONSIBLE 2 NAME
- RELEASE STRATEGY ROLE RESPONSIBLE 3 NAME
- RELEASE STRATEGY ROLE RESPONSIBLE 4 NAME
- RELEASE STRATEGY ROLE RESPONSIBLE 5 NAME
- RELEASE STRATEGY ROLE RESPONSIBLE 6 NAME
- RELEASE STRATEGY ROLE RESPONSIBLE 7 NAME
- RELEASE STRATEGY ROLE RESPONSIBLE 8 NAME
- RELEASE STRATEGY SID

Procurement Status 1749

- # Procurement Status Sid
- Procurement Status 1 Code
- Procurement Status 2 Code
- Procurement Status 3 Code
- Procurement Status 4 Code
- Procurement Status 5 Code
- Procurement Status 6 Code
- Procurement Status 7 Code
- Created Date
- Changed Date

Procurement Document Class 1750

Procurement Document Class Sid
- Document Type Code
- Document Type Name
- Document Line Type Code
- Document Line Type Description
- Requisition Multiplier
- Quotation Multiplier
- Purchase Order Multiplier
- Contract Multiplier
- User Multiplier 1
- User Multiplier 2
- User Multiplier 3

Requisition Activity Document 1751

- ACCOUNT IDENTIFIER
- APPROVAL STATUS DATE
- BLOCKED STATUS DATE
- CHANGED DATE
- CLOSED STATUS DATE
- CONTRACT REFERENCE DOCUMENT NUMBER
- CONTRACT REFERENCE ITEM NUMBER
- CREATED DATE
- DELETION INDICATOR
- DOCUMENT COMPANY CODE
- DOCUMENT CURRENCY CODE
- DOCUMENT ITEM NUMBER
- DOCUMENT LINE TYPE CODE
- DOCUMENT NUMBER
- DOCUMENT TYPE CODE
- GROUP TO DOCUMENT EXCHANGE RATE
- HEADER TEXT
- ITEM TEXT
- LOCAL CURRENCY CODE
- OPEN STATUS DATE
- PURCHASE ORDER REFERENCE DOCUMENT NUMBER
- PURCHASE ORDER REFERENCE ITEM NUMBER
- REASON CODE
- REASON DESCRIPTION
- REFERENCE DOCUMENT COMPANY CODE

- REFERENCE DOCUMENT ITEM NUMBER
- REFERENCE DOCUMENT NUMBER
- REFERENCE DOCUMENT TYPE CODE
- REQUISITION ACTIVITY DOCUMENT SID
- REQUISITIONER NAME
- USER NAME

Quotation Activity Document 1752

- APPROVAL STATUS DATE
- BLOCKED STATUS DATE
- CHANGED DATE
- CLOSED STATUS DATE
- CREATED DATE
- DELETION INDICATOR
- DOCUMENT COMPANY CODE
- DOCUMENT CURRENCY CODE
- DOCUMENT ITEM NUMBER
- DOCUMENT LINE TYPE CODE
- DOCUMENT NUMBER
- DOCUMENT TYPE CODE
- DOCUMENT VENDOR NUMBER
- GROUP TO DOCUMENT EXCHANGE RATE
- HEADER TEXT
- ITEM TEXT
- LOCAL CURRENCY CODE
- OPEN STATUS DATE
- QUOTATION ACTIVITY DOCUMENT SID
- REASON CODE
- REASON DESCRIPTION
- RECEIVED DATE
- REFERENCE DOCUMENT COMPANY CODE
- REFERENCE DOCUMENT ITEM NUMBER
- REFERENCE DOCUMENT NUMBER
- REFERENCE DOCUMENT TYPE CODE
- RFQ COLLECTIVE NUMBER
- USER NAME

Purchase Order Activity Document 1753

Purchase Order Document Sid

- Document Number
- Document Item Number

- Document Type Code
- Document Company Code
- Document Line Type Code
- Reference Document Number
- Reference Document Item Number
- Reference Document Type Code
- Reference Document Company Code
- Vendor Internal Reference Number
- Account Identifier
- Document Currency Code
- Reason Code
- Complete Shipment Indicator
- Deletion Indicator
- Delivery Completed Indicator
- Estimated Price Indicator

Contract Activity Document 1755

- ACCOUNT IDENTIFIER
- APPROVAL STATUS DATE
- BLOCKED STATUS DATE
- CHANGED DATE
- CLOSED STATUS DATE
- CONTRACT ACTIVITY DOCUMENT SID
- CONTRACT RENEWAL DATE
- CONTRACT RENEWAL LEAD TIME
- CONTRACT TERM DAY COUNT
- CONTRACT VALIDITY PERIOD END DATE
- CONTRACT VALIDITY PERIOD START DATE
- CREATED DATE
- CUSTOMER INTERNAL REFERENCE NUMBER
- DELETION INDICATOR
- DOCUMENT COMPANY CODE
- DOCUMENT CURRENCY CODE
- DOCUMENT ITEM NUMBER
- DOCUMENT LINE TYPE CODE
- DOCUMENT NUMBER
- DOCUMENT TYPE CODE
- ESTIMATED PRICE INDICATOR

- FIXED EXCHANGE RATE INDICATOR
- GROUP CURRENCY TOTAL TARGET VALUE
- GROUP TO DOCUMENT EXCHANGE RATE
- HEADER TEXT
- ITEM TEXT
- LANGUAGE CODE
- LAST ITEM NUMBER
- LINE ITEM EFFECTIVE END DATE
- LINE ITEM EFFECTIVE START DATE
- LOCAL CURRENCY CODE
- ONE DELIVERY SHIPMENT INDICATOR
- OPEN STATUS DATE
- OVERDELIVERY TOLERANCE LIMIT PERCENTAGE
- PAYMENT TERMS CODE
- PENALTY TERMS CODE
- PLANNED DELIVERY DATE
- QUALITY INSPECTION INDICATOR
- REFERENCE DOCUMENT COMPANY CODE
- REFERENCE DOCUMENT ITEM NUMBER
- REFERENCE DOCUMENT NUMBER
- REFERENCE DOCUMENT TYPE CODE
- REQUISITION REFERENCE DOCUMENT NUMBER
- REQUISITION REFERENCE ITEM NUMBER
- REVISION LEVEL NUMBER
- RFQ REFERENCE DOCUMENT NUMBER
- RFQ REFERENCE ITEM NUMBER
- UNDERDELIVERY TOLERANCE LIMIT PERCENTAGE
- UNLIMITED OVERDELIVERY INDICATOR
- USER NAME
- VENDOR INTERNAL REFERENCE NUMBER

Vendor 1755

Vendor Sid

- Vendor Account Number
- Company Code
- Purchasing Organization Code
- Vendor Name
- Vendor Short Name
- City Name
- District Name

- Postal Code
- Region Code
- Region Name
- Country Code
- Country Name
- Industry Code
- Industry Description
- Plan Group Code
- Plan Group Name
- ABC Indicator
- Created Date
- Changed Date
- Vendor Category Code
- Vendor Category Description
- Vendor Category 1 Code

Batch 1756

Batch Sid

- Material ID
- Plant ID
- Batch Number
- Availability Date
- Shelf Like Expiration Date
- Batch Status Code
- Restricted Use Indicator
- Vendor Account Number
- Vendor Batch Number

Storage Bin 1757

Storage Bin Sid

- Warehouse Number
- Warehouse Name

- Storage Type Code
- Storage Type Description
- Storage Bin Id
- Storage Section Id
- Storage Section Name
- Bin Type Code
- Bin Type Description
- Bin Section Id
- Bin Unit Number
- Bin Unit Maximum Number
- Dynamic Bin Indicator
- Bin Load Capacity
- Block Indicator
- Block Reason Code
- Block Reason Description
- Bin Quants
- Bin Quants Maximum
- Weight Unit
- Inventory Method Code
- Inventory Method Description
- Inventory Preparation

Material Movement Document Class 1758

- # Movement Document Sid
- Document Number
- Document Year
- Document Item Number
- Local Currency Code
- Local Currency Value
- Header Description
- Item Description
- Document Unit Quantity

- Fiscal Variant
- User Name
- Hour of Day
- Posting Date

Valuation 1759

Valuation Sid
- Material Id
- Valuation Area Code
- Valuation Type Code
- Price Control Code
- Price Control Description
- Local Currency Code
- Group Currency Code
- Local Currency Value

Stock Class 1760

Stock Class Sid
- Stock Type Code
- Special Stock Code
- Stock Type Description
- Special Stock Description
- Blocked Multiplier
- QI Multiplier
- Cust Consign Multiplier
- Vendor Consign Multiplier
- Unrestricted Multiplier
- Overall Status Level 1
- Overall Status Level 2
- Overall Status Level 3
- Overall Status Level 4
- Overall Status Level 5

- User Multiplier 1
- User Multiplier 2
- User Multiplier 3

Plant 1761

- # Plant Sid
- Plant Id
- Storage Location Code
- Unloading Point Name
- Plant Name
- Postal Code
- City Code
- City Name
- Country Code
- Country Name
- County Code
- County Name
- Region Code
- Region Name
- Plant Category Code
- Plant Category Name

Material Storage 1762

- # Plant Material Sid
- Material ID
- Plant ID
- Special Procurement Type Code
- Special Procurement Description
- Uom Code
- Mrp Profile Code
- Mrp Controller Code
- Mrp Contoller Name

- Valuation Category Code
- Valuation Category Description
- Replenishment Lead-Time
- Reorder Point Quantity
- Maximum Stock Quantity
- Safety Stock Quantity
- Shelf Life Expiration Date
- Abc Indicator
- Purchasing Group Code

Shipping Point 1763

Shipping Point Sid
- Shipping Point Code
- Shipping Point Name

Customer Demographic 1764

Customer Demographic Sid
- Gender Description
- Age Group Code
- Age Group Description
- Marital Status Code
- Marital Status Description
- Household Child Count Code
- Household Size Code

Sales Status 1765

Sales Status Sid
- Sales Status Code
- Payment Method Code
- Ship Status Code
- Derived Status

Sales Document Class 1766

- # Document Class Sid
- Document Class Type Code
- Document Type Code
- Document Type Name
- Document Category Code
- Document Category Name
- Document Line Type Code
- Document Line Type Name
- Include In Fact
- Debit Credit Multiplier
- Document Status Code
- Document Status Name
- Payment Method Code

Promotion 1767

- CHANGED DATE
- CREATED DATE
- DISCOUNT AMOUNT
- DISCOUNT END DATE
- DISCOUNT ID
- DISCOUNT NAME
- DISCOUNT PERCENTAGE
- DISCOUNT START DATE
- PROMOTION END DATE
- PROMOTION IDENTIFIER
- PROMOTION NAME
- PROMOTION SID
- PROMOTION START DATE
- PROMOTION TYPE CODE
- PROMOTION TYPE NAME
- SELLING PRICE AMOUNT

GL Activity Document 1768

- # GL Activity Document Sid
- Document Number

- Document Item Number
- Asset Main Number
- Asset Sub Number
- Changed Date
- Clearing Document Number
- Commitment Item Identifier
- Created Date
- Debit Credit Indicator
- Document Currency Code
- Document Date
- Document Header Text
- Document To Local Exchange
- Financial Budget Item Identifier
- Fiscal Year
- Line Item Identifier
- Line Item Text
- Partner Account Number
- Partner Profit Center
- Payment Method Code
- Payment Method Name
- Project Number
- Reference Document Item Number
- Reference Document Number
- Reference Type Code
- Reference Document Type Name

Accounting Document Class 1769

Accounting Document Class Sid

- Accounting Document Class Identifier
- Document Type Code
- Document Type Name
- Transaction Type Code

- Transaction Type Name
- Adjustment Reason Code
- Adjustment Reason Description
- Match Transaction Type Code
- Match Transaction Type Description
- Invoice Multiplier
- Payment Multiplier
- Adjustment Multiplier
- Bad Debt Multiplier
- User Defined 1 Multiplier
- User Defined 2 Multiplier
- User Defined 3 Multiplier
- User Defined 4 Multiplier
- User Defined 5 Multiplier
- Changed Date
- Created Date

Budget Version 1770

Budget_Version_Sid

- Budget Version ID
- Budget Version Name
- Changed Date
- Created Date
- Ledger ID
- Ledger Name

Cost Center 1771

Cost Center Sid

- Cost Center Code
- Changed Date
- Controlling Area Key Code
- Controlling Area Name

- Cost Center Department Code
- Cost Center Department Name
- Cost Center Description
- Cost Center Leaf Level Number
- Cost Center Manager Name
- Cost Center Name
- Cost Center Responsible Executive
- Created Date
- Local Currency Code
- Region Code
- Region Name
- Valid From Date
- Valid To Date
- Cost Center Level 1 Code
- Cost Center Level 2 Code

Flexidim 1772

- FLEXIDIM SID

AR Activity Document 1773

- ADJUSTMENT REASON CODE
- ADJUSTMENT REASON DESCRIPTION
- AR ACTIVITY DOCUMENT SID
- BATCH NUMBER
- BATCH TYPE CODE
- CHANGED DATE
- CREATED DATE
- CUSTOMER PURCHASE ORDER REFERENCE NUMBER
- DISCOUNT BEFORE DATE
- DOCUMENT COMPANY CODE
- DOCUMENT CURRENCY CODE
- DOCUMENT ITEM NUMBER
- DOCUMENT NUMBER
- DOCUMENT OPEN DATE
- DOCUMENT RECORD DATE
- DOCUMENT SUFFIX EXTENSION NUMBER
- GROUP CURRENCY CODE

- GROUP TO LOCAL EXCHANGE RATE
- INVOICE CLEARED DATE
- INVOICE DOCUMENT ITEM NUMBER
- INVOICE DOCUMENT NUMBER
- LOCAL CURRENCY CODE
- LOCAL TO DOCUMENT EXCHANGE RATE
- MATCHING DOCUMENT NUMBER
- MATCHING DOCUMENT SUFFIX NUMBER
- MATCHING DOCUMENT TYPE CODE
- OPEN INDICATOR
- PAYMENT DUE DATE
- PAYMENT IDENTIFIER
- PAYMENT INSTRUMENT CODE
- PAYMENT INSTRUMENT DESCRIPTION
- PAYMENT LINE IDENTIFIER
- PAYMENT OR ADJUSTMENT DATE
- PAYMENT TERM CODE
- PAYMENT TERM DESCRIPTION
- SA DOCUMENT COMPANY CODE
- SA DOCUMENT ITEM NUMBER
- SA DOCUMENT NUMBER
- SA DOCUMENT TYPE CODE
- TAXATION AUTHORITY CODE
- TAXATION AUTHORITY DESCRIPTION
- TRANSACTION TYPE CODE

Company Consolidation 1374

- # Company Consolidation Sid
- Consolidation Identifier
- Consolidation Name
- Changed Date
- Company Identifier
- Company Name
- Created Date
- Group Currency Code
- Local Currency Code

Profit Center 1775

- # Profit Center Sid

- Profit Center Code
- Changed Date
- Controlling Area Key Code
- Controlling Area Name
- Created Date
- Profit Center Department Code

AP Activity Document 1776

#AP Activity Document Sid

- Document Company Code
- Transaction Type Code
- Document Number
- Document Item Number
- Batch Type Code
- Batch Number
- Adjustment Reason Code
- Payment Term Code
- Payment Instrument Code
- Taxation Authority Code
- Document Open Date
- Payment Due Date
- Discount Before Date
- Payment or Adjustment Date
- Invoice Cleared Date
- Group Currency Code
- Local Currency Code
- Document Currency Code
- Group To Local Exchange Rate
- Local To Document Exchange Rate
- Matching Document Type Code
- Matching Document Number
- Matching Document Item Number

- MM Document Company Code
- MM Document Type Code
- MM Document Number
- MM Document Item Number
- PO Document Company Code
- PO Document Type Code
- PO Document Number
- PO Document Line Number
- Adjustment Reason Description
- Payment Term Description
- Payment Instrument Description
- Taxation Authority Description
- Open Indicator
- Included In Summary Indicator
- Created Date
- Changed Date

Movement Activity 1777

Movement Document Sid
- Document Number
- Document Year
- Document Item Number
- Local Currency Code
- Local Currency Value
- Header Description
- Item Description
- Document Unit Quantity
- Fiscal Variant
- User Name
- Hour of Day
- Posting Date

Stock Usage Forecast Version 1778

- CHANGED DATE
- CORRECTED VALUE
- CREATED DATE
- FORECAST FIRST DAY DATE

- FORECAST PERIOD NUMBER
- FORECAST VALUE
- MODIFIED FORECAST FIRST DAY DATE
- SEASONAL INDEX VALUE

User Category 1779

- AVERAGE VALUE
- CATEGORY NAME
- CHANGES WARNING FLAG
- ITEM NUMBER
- LEVEL 1 ITEM DESCRIPTION
- LEVEL 2 ITEM DESCRIPTION
- LEVEL 3 ITEM DESCRIPTION
- LEVEL 4 ITEM DESCRIPTION
- LEVEL 5 ITEM DESCRIPTION
- LOWER RANGE
- SYSTEM INDICATOR
- UPPER RANGE
- USER ATTRIBUTE 1
- USER ATTRIBUTE 10
- USER ATTRIBUTE 2
- USER ATTRIBUTE 3
- USER ATTRIBUTE 4
- USER ATTRIBUTE 5
- USER ATTRIBUTE 6
- USER ATTRIBUTE 7
- USER ATTRIBUTE 8
- USER ATTRIBUTE 9
- USER CATEGORY SID

BPM Application

One embodiment of the present invention provides an integrated data warehouse application, which offers the benefits of both data warehouses and data marts, i.e., the breadth of an enterprise-wide data warehouse and the luxury of incremental data mart implementation. This structure enables an organization to maximize the return on its ERP, e-commerce, and other source data system investments. Released from the analysis and reporting confines of ERP systems, users can now creatively explore business problems and make equally creative and effective business decisions.

Moreover, users may incrementally add data marts over time, expanding the integrated data warehouse at their own pace. Each new mart fits seamlessly with its predecessors, extending the scope of the data warehouse to produce effective cross-functional business content—the fundamental information users need to understand their business drivers.

For example, if the inventory turnover rate suddenly dropped, users would want to know why. With an integrated data warehouse system comprised of several subject-specific marts, users could explore whether the root of the problem lies in Sales or in Inventory, perhaps the result of a change in the company sales compensation plan or a tightening of credit policy. By sharing the same conforming dimensions (for instance, "product") in both the Sales and Inventory marts, users could generate these types of revealing cross-functional views. The result: enterprise-wide decision-making is improved.

Prior to describing the BPM system using the integrated data warehouse according to an embodiment of the present invention, a typical way of integrating data warehouse and data mart creations are described.

Creating and implementing a successful integrated data warehouse involves a lengthy series of complex steps and activities, and requires expertise in numerous highly specialized areas.

Despite the substantial hurdles, some information technology (IT) departments elect to build data warehouses themselves. It is not unusual for these projects to end up over budget, miss major milestones, or even fail due to the unanticipated complexity of extracting, transforming, and loading the right data.

The BPM Application 104 offers an out-of-the-box integrated analytic solution that allows IT departments to provide users with high quality cross-functional business performance management in a short time, freeing up specialized IT resources for immediate impact. The BPM solution puts robust decision-making solutions in the hands of users quickly and cost-effectively.

Out-of-the-box BPM save users a complete business cycle in deploying and extending their integrated data warehouse solution. A complete business cycle can be spent on establishing end-user needs, data mart design, source system analysis, data mart creation, target system and configuration environment, data mart operation, and business analysis and report. The out-of-the-box BPM Application 104 (including the initial load, user acceptance, and implementation) requires considerably less time than conventional solutions creating an integrated data warehouse from scratch.

The development of an effective BPM Application 104 includes several key components, such as:

- Business decision maker requirements (both functional and cross-functional) defining the type of analysis required based on best practices
- A technical design which ensures consolidated data from across the organization (i.e., ERPs and other data sources), delivering consistent and reliable results
- A strategic architecture which allows for incremental implementation business performance management by functional area
- Enterprise Business Intelligence (EBI) designed to deliver rich analysis and reporting, with the functionality to share information across the organization, as well as across corporate intranets and extranets with key business partners

The BPM Application 104 is a series of business analytical solutions designed to deliver key information to an organization's core business functions, including Sales, Accounts Receivable (AR), General Ledger (GL), Accounts Payable (AP), Inventory Management and Procurement. While each application includes rich functional analysis, applications can be used together to join other operational data from across the demand and supply sides of the organization for a coordinated enterprise view of performance.

Each BPM Application 104 business analytical solution is built on three pillars:

- Rich business content with predefined BI reports based on best practices as defined through research with industry experts
- Robust technical architecture, ERP source analysis, installation wizards, and production system management

- Conforming design allowing for the combination of multiple applications based on common dimensions (e.g., customers, products, vendors)

The BPM Application 104 brings together the components used to deliver the important business analysis required for effective decision making. This includes source ERP system analysis, data extraction and transformation, best practices, data architecture and EBI.

Before attempting to build an integrated data warehouse, IT departments need to fully assess the obstacles and risks involved. An integrated data warehouse project requires a diverse array of skills and experience. The following six skill-sets are important to a successful implementation.

1. Business Requirements Analyst:

   Acts as liaison between the data warehouse project team and the warehouse's end users. This person identifies and documents the needs of the business and produces a plan for addressing these needs using the data warehouse. The Business Requirements Analyst should have excellent communications skills and an ability to assess business information needs.

2. Subject Matter Experts:

   Typically end users who are familiar with the information and business needs of the internal groups or areas that they represent and who have significant knowledge of the data. These people help standardize on different aspects related to the data and work to resolve issues across business areas.

3. Source Systems Experts:

   Identifies source fields based on the requirements specified for the warehouse. Also identifies the source hurdles that will need to be overcome in order to implement.

4. Data Architect:

   The Data Architect develops and maintains the logical and physical data models of the warehouse, and is able to identify the most valuable data, integrate it, and

develop the correlating data model. Also responsible for recommending the optimal system of record, the Data Architect should ensure the company's business needs are incorporated into a technical solution.

5. Data Acquisition Developer and Architect:

Responsible for extracting data from a source system, performing associated transformations, and making the data available for loading into the data warehouse. The Data Acquisition Developer and Architect should understand extraction and transformation, identify transformations, and define source-to-target mappings.

6. Business Intelligence (BI) Developer:

Develops solutions that allow end users to easily and consistently access the data warehouse. The BI Developer should understand the business needs, be able to incorporate these into technical solutions, and be skilled in end-user access, reporting, and analysis tools.

Assembling the necessary skills and expertise is the first step of many involved in the process of successfully developing an integrated data warehouse. Building an integrated data warehouse includes the following process.

1. Establishing End-User Needs
    - Business requirements analysis
2. Data Mart Design
    - Logical data model
    - Physical data model
3. Source System Analysis
    - Source system analysis and mappings
4. Data Mart Creation
    - Data acquisition process design
    - Data acquisition construction
5. Target System and Configuration Environment
    - Technical architecture design
6. Data Mart Operation
    - Maintenance and administration

7. Business Performance Management (which includes Business Analysis and Reporting) (Business Intelligence) and other features described herein
    - Data access design
    - Data access construction

Assessing business requirements can take up to 50% of the entire effort of building a warehouse.

An IT department should know its users' business requirements from A to Z. How will people use information? What questions do they need answered? Do they want high-level views or transaction details? Will they use this information in their offices or on the road? By exploring users' business requirements—and fully understanding how the departments of the enterprise interact—a user will be ready to create the appropriate metrics and business rules an effective analysis and reporting solution requires. Including the content in the warehouse that effectively supports business goals is a key to achieving maximum return on investment.

Designing data marts involves turning the business needs that have been identified into useful data. The process involves designing the data mart logical data model and the subsequent physical data model. Many questions should be answered at this stage: Which end users should be involved during the design sessions? Do data sources exist for some or all of the intended data? Have they chosen an ETL tool? Will the initial design include metadata? If so, will it comprise technical metadata, business metadata, or both?

Once these questions are addressed, to optimize the solution for BPM, a high-speed star schema data marts that logically arrange data and allows for cross-functional views of business operations should be designed. Simply put, the star schema data marts, based on relational data, use shared, conformed dimensions to achieve a unified view of traditional processes. In effect, a Sales data mart would define "Product X" the same way that the Inventory data mart does. These marts should also be scalable and contain embedded knowledge of the business performance management applications they will serve.

The next step, source system analysis, should be undertaken by someone who is familiar with the user's ERP, e-commerce, and other source systems as well as any modifications that they have made to them. This expertise is used to identify which data to extract and how to extract it.

The source system expert should understand the unique parameters, fields, hierarchies, and technical approaches that characterize each ERP solution. Many organizations outsource the initial design of their ERP and e-commerce systems to consultants who take their source expertise with them once the contract is completed. This, coupled with the high rate of movement of in-house IT resources leaves companies with a knowledge gap regarding these complex source systems. The solution is typically to retain consulting expertise, which can become prohibitively costly and, depending on a consultant's availability, even delay the solution delivery date.

Once one knows where to look for data in the source systems, their next step is to develop source to target mappings and ensure that they extract, transform, and load ERP and other data into their data marts. Poor source data quality, missing source data, and redundant source data, among other challenges, can complicate this process.

Ultimately, the ETL system should flag errors during the ETL process, minimize computing resources, maximize automation, and incorporate best warehousing practices such as slowly changing dimensions, history preservation, and changed-data capture. Delivering these capabilities will ensure that the process runs as smoothly as possible and that the data generated is accurate.

One should also know how to incrementally add data marts. For instance, if a user adds an Inventory mart to their existing Sales and Finance marts, the user should be careful to avoid creating data definition conflicts between the marts. Synchronization and coordination are key because problems at this stage can sabotage data integrity.

The target system and configuration environment need to be checked. For example, is one using an NT application server to run an ETL code and populating an Oracle database on a Unix platform? Or are they running their ETL code on Unix and populating a Microsoft

SQL server on NT? Depending on the platform and database, one will have to vary the way that they install and configure their solution.

Tasks associated with operating, managing, and maintaining the integrated data warehouse include loading data marts from operational systems, troubleshooting the system, restarting failed jobs, and scheduling jobs so that they minimize impact on source systems.

Building an integrated data warehouse from scratch requires substantial IT expertise, not to mention substantial time and money.

An embodiment according to another aspect of this invention also relates to building a BPM system, and describes a packaged solution. The BPM System 101 comprises of a BPM Model 102, a Dimensional Data Model 103 and a BPM Application 104. The BPM Application 104 comprises a wide range of end-to-end analytic applications for BPM that include defined extractions and data models, business content and known practices displayed through captured business metrics, and a suite of KPIs, reports, and analyses.

Built upon an operational framework and robust production environment, the BPM system 101 helps decision-makers quickly derive business value from their enterprise data. By using the BPM system 101, organizations receive a cross-functional view of their ERP and e-business data, which provides a strategic perspective on KPIs. And they reduce implementation costs and effort, which accelerates time to results.

Building a traditional data mart from scratch involves evaluating every component of the end-to-end solution— the extraction process, transformation process, data models, data marts, multidimensional components, and user reports—and then integrating them into a high-performance analysis and reporting system based on an existing specific ERP system. With the BPM Application 104, this evaluation and integration work is done for a user. Multiple pieces can work together out of the box, and help to avoid lengthy evaluations.

As well, one embodiment of a component of the BPM Application 104, the BPM system Console 1906, which is a production control environment, may integrate and manage all the extensions, as further described below. This capacity may save users from dealing with

extensions on their own; users may easily tie them into the BPM system Console 1906 and may gain the same production control and management benefits that accrue to the out-of-the-box applications themselves.

In addition, users may deploy components of the BPM Application 104 as used, for example, on the Web, in a client/server configuration— whatever is most effective for their environment. And by taking advantage of other business intelligence tools, such as, OLAP tools and visual reports, organizations may be well equipped to meet the information desires of their users.

The BPM Application 104 includes five components as described in Figure 19. Figure 19 shows:

An ERP System 1901;
A BPM Application 104;
A Set of Extract, Transform, and Load Software Programs 1902;
A Star Schema 1903;
Catalog Cubes Reports 1904;
An Operational Framework 1905; and
A Console 1906.

The business driven extractions and source-to-target mappings are labeled as "Extract, Transform and Load" 1902 on Figure 19. Business-driven extractions and source-to-target mappings incorporate business rules that unravel major ERP systems such as SAP R/3, Oracle Applications, and J.D. Edwards, and are open to alternative sources.

A complex part of building a traditional data mart involves extracting the right data from the source system, transforming it into the desired form, and loading it into the data marts. To facilitate and expedite this process, a repository is built for the BPM ETL tool 1902. The ETL tool 1902 understands both the source ERP system and the targets. This repository uses business rules to transform data from the ERP system to the targets.

The BPM Application 104 simplifies the complex process of extracting data from specific source systems such as J.D. Edwards, SAP R/3, and Oracle, overcoming the technical hurdles and addressing the unique characteristics involved in each system.

Extraction, Transformation, and Data Loading (ETL)

Extract data may involve in-depth knowledge about the underlying source system. Traditionally, developers of data warehousing needed to know where the relevant data comes from and what the specific data structures look like. They also needed to know about the technical hurdles specific to their source systems. The BPM Application 104 has functions to adapt to a variety of source systems. Am embodiment is based on extensive experience with SAP, Oracle, and J.D. Edwards ERP systems. For example, SAP uses pooled and clustered table structures, Oracle provides "flex" fields, and J.D. Edwards maintains address books in a special way. Each system contains unique characteristics that affect data mart building. The BPM Application 104 addresses these source features. This inherent source system intelligence of the BPM Application 104 spares users from having to spend much time analyzing complex ERP and e-business systems.

In addition to speeding the extraction process, the ETL tool 1902 incorporates safeguards to protect data integrity. As data comes across from the source system, the ETL tool 1902 looks for specific conditions. If these conditions are absent, the tool generates an error log and lists the missing data, simplifying system administration and trouble-shooting.

Missing data, incomplete data, or inaccurate data may degrade the quality of a business performance management solution and substantially hinder the business results.

To generate consistently high data quality, the ETL tool 1902 contains transformation functions that format and integrate source data before it is stored in a BPM data mart. This process might involve any number of functions: restructuring data files, records, and fields; removing superfluous data; decoding and translating field values to enhance data; improving data readability; validating data; calculating new values from one or more source columns; simplifying data; and changing data types. The transformation process may also reject records that do not satisfy business rules. As part of the transformation process, the

BPM Application 104 may employ surrogate keys—that substitute for natural keys—to improve processing performance.

Once the source data has been transformed, the BPM Application 104 loads it into the destination data marts and make the data available to users for analysis and reporting. The Data Model may be viewed as an abstract collection of data marts.

The components of the BPM Application 104 may apply different updating rules to different tables depending on the nature of the component data. By tailoring the data-loading process to the data, the BPM Application 104 updates information faster with less demand on the target system. For instance, tables defined as "static" contain data that changes infrequently and therefore needs refreshing only on an *ad hoc* basis. Tables that require more frequent refreshing can be treated differently as well, according to the characteristics of their data. Users may perform a complete refresh, a changed-data capture, or a slowly changing dimension.

The BPM Application 104 also includes stop-recover strategy, which allows extraction jobs that have been interrupted to be restarted. This feature saves administrators time and helps ensure data integrity.

To solve a business problem, sometimes decision-makers want to see transaction details, not just higher level summaries. For this reason, the components of the BPM Application 104, which contain both relational and OLAP data, extract the most granular data from the source ERP systems and use it to populate the data marts. Decision-makers may therefore access transaction-level detail and gain a micro view of the business issues at hand.

Offering detailed granularity takes pressure off the source ERP system 1901 as well. Rather than query the production system every time they need to perform detailed analysis, decision makers may simply query the components of the BPM Application 104 and glean the insight they want.

Packaged and customizable business reports and multidimensional data models, labeled as "Catalog, Cubes, Reports" 1904 on Figure 19, reflect the information and KPIs used to manage, measure, and improve business performance in each functional area.

Operational Framework

The operational framework of the BPM Application 104 is labeled as "Operational Framework" 1905 on Figure 19. This Operational Framework 1905 reflects how the BPM system 101 is productized 105. The Operational Framework 1905 turns the application into a product. The Operational Framework 1905 allows the user to:

- Customize the BPM Application 104 to reflect their unique ERP environment 1901;
- Controls the operation of the BPM Application 104 in a production environment, and contains a component which includes stop-recover strategy; and
- Handles exceptions during data mart updates.

The Operational Framework 1905 provides functionality that makes the BPM system 101 responsive to the variations of ERP implementations. The Operational Framework 1905 uses information stored in the operational framework schema to adjust the Business-driven extractions and source-to-target mappings business rules 1904 to reflect the requirements of the particular ERP implementation 1901. The operational Framework 1905 uses information stored in the operational framework schema to determine the status of the extracts that load the data mart and to determine what new data needs to be extracted to the data mart.

To help ensure that an integrated data warehouse accurately captures changes to dimensions that vary infrequently, such as product hierarchies, sales regions, and so on, the BPM Application 104 may accommodate slowly changing dimensions.

This feature offers two primary benefits. First, it may allow users to go back and find out what was going on at a point in corporate history. In other words, although employees may have moved or sales territories may have been redrawn, the system will accurately present information about these slowly changing dimensions as they existed at the time of interest.

This may allow users to derive consistent, repeatable results, solidifying the value of their decision support system by preserving history.

Second, users may see all values or changes over time. This capability furnishes the insight to uncover longer-term trends and business impacts. If users have incomplete historical information, they may end up making improper assumptions and compromising the quality of their decisions. Whereas ERP systems 1901 may typically archive all but the most recent year or two's worth of data without access to supporting details, the BPM Application 104 allows users to dig into an issue's past several years or more to gain revealing perspectives about its present. This trend-analysis capability allows companies to track the impact of decisions over time.

In the BPM Application 104, if a sales person transfers to a different region in mid year, the BPM data marts may allow an organization to record the move and reflect the change in their database. Without record of this slowly changing dimension, a year-end revenue summary by region may allocate their entire year's sales to the new regional manager, overstating their accomplishments and understating the previous manager's performance. Companies that make decisions based on this type of misleading information may end up making incorrect assumptions and that can result in costly mistakes.

With slowly changing dimensions, the revenue that the sales person generated before their departure will properly accrue to the previous regional sales manager, and the revenue that they generate after the move will be credited to the new manager. Over time, certain dimensions—employees, products, and customers—may change, and the BPM Application 104, by creating another dimension record, has the flexibility to accommodate these changes and produce an accurate view of business performance.

The BPM Application 104 handles slowly changing dimensions so that the integrated data warehouse accurately captures infrequent but important data changes. So users can rely on the data's integrity at all times.

The BPM Application 104 may also include changed-data capture, the capacity to periodically update the data marts with current information without rebuilding them from

the ground up. Changed-data capture detects new, modified, or deleted records in source systems and updates the BPM data marts with those changes.

To improve updating speed, the BPM Application 104 splits the changed-data capture function into two. One inserts new data incrementally in bulk, a quick and efficient approach that eases the pressure on processing resources. The other step updates changes to existing data, a process that involves going into the database, finding the modified row, updating it, and then saving the change. Given that changes are less voluminous than new data, the BPM Application 104 handles the majority of updating with the more efficient and speedier process. Updating may therefore be conducted successfully even in the face of continually shrinking update windows.

To further its efficiency, the BPM Application 104 may look only at the data that has changed in the ERP system 1902. Recognizing the date and time of the last update, the BPM ETL tool 1902 requests only records from that update forward. Asking what records have changed and determining whether the changed records are of interest may filter this subset further. This approach demands far fewer CPU (central processing unit) resources than may be required to extract all the ERP data, to compare it to the data mart, and to load the difference—an unwieldy process that would involve examining every row in the ERP system. Consequently, changed-data capture improves system performance and speeds updates. Changed-data capture allows users to periodically update data marts without reloading them from scratch.

The BPM System Console 1906

The BPM system Console 1906 employs easy-to-use configuration parameters to help users tailor components of the BPM Application 104 to their environment.

If the user's company is like most, the user may likely customize their SAP, Oracle, or J.D. Edwards source system. If so, their hierarchies, hierarchy types, status codes, charts of accounts, exchange rates types, and other fields may differ from the source system defaults. The BPM system Console 1906 has parameters which help users configure the BPM Application 104 to reflect these changes. This out-of-the-box convenience saves a user effort, speeds configuration, and delivers BPM value faster.

Figure 20 is a screen shot of the BPM system Console 1906 which enables users to augment the BPM Application 104 to reflect their particular implementation of the BPM Application system through configuration parameters. The BPM system Console 1906 matches the configuration to the user's target database and equipment. Whether the user uses Oracle RBDMS or Microsoft SQL Server on NT or Unix platforms, the BPM system Console 1906 may tailor its implementation to the user's physical environment.

The BPM system Console 1906 enables users to import historical ERP data at a pace convenient to their business. This initial load job may take a long time, a potential problem if users attempt to import all this data during a single extended window. Using the BPM system Console 1906, however, users may schedule the loading to occur in phases—which users set— and populate the marts during slow network activity periods. This convenience avoids saddling users with degraded network performance while the loading occurs.

Users may also use the BPM system Console 1906 to simplify the ongoing ETL processes 1902. It may help users sequence jobs and determine which are to run, what data they are to extract, and when they are to run (i.e., date ranges).

The BPM system Console 1906 may also enable users to run *ad hoc* jobs or put scheduled jobs on hold.

Moreover, the BPM system Console 1906 may equip users to maintain their system in top form. In the BPM Application 104, administrative tables within the BPM Application 104 relational database store information pertaining to the system's operation. The BPM system Console 1906 uses this information to generate job status reports and error reports, giving users a firm handle on their system at all times.

The BPM System Console 1906

The engine behind the BPM Application 104 resides within the BPM system Console 1906, an easy-to-use production control environment that simplifies the up front installation, configuration, and loading of the BPM Application 104. It also makes maintaining the marts easier once they are up and running.

Administrators may use the BPM system Console 1906 to set extraction sequences, and establish dependencies and priorities. It may also enable organizations to implement co-ordinated analytic applications incrementally and manage them centrally.

Labeled as "Console" 1906 on Figure 19, the BPM system Console may be considered part of the Operational Framework 1905. The BPM system Console 1906 provides intelligent ETL job 1902 control for *ad hoc* or scheduled data loads, sequences extraction jobs, and defines extract dates. It allows a user to set configuration parameters so that the data warehouse reflects ERP site-specific configurations. Figure 12 is a screen shot of the BPM system Console 1906 that manages ETL processes 1902 automatically.

Administrative Reporting

In addition to the functionality afforded by the BPM system Console 1906, the BPM Application 104 administrative reporting lets IT:

- Track extraction history, including:
  - Tables;
  - Start & end date, and elapsed time;
  - Extraction from & to date;
  - Row counts; and
  - Errors.
- Track errors, including:
  - Extraction object;
  - Error count;
  - Error type;
  - Severity;
  - Date; and
  - Time.

By packaging the BPM Application 104 into a series of departmentally specific, coordinated analytic applications, the BPM Application 104 enables users to build an enterprise view of their organization incrementally and strategically. The benefits include that users may promptly derive the business insight they need from the packaged reports and analyses

provided, and IT departments escape the high-labor, high-cost, high-risk of many data warehouse and data mart practices, freeing time to refocus on other priorities.

With the BPM Application 104, users may build an enterprise view of their organization. Users may quickly derive the business insight they need from packaged reports and analyses provided, and IT departments are freed from the high labor and high costs associated with many data warehouse and data mart initiatives.

Examples of Components of the BPM Application 104

The BPM Application 104 contains a number of packaged reports that reflect the business requirements for important areas such as Finance, Sales, and Inventory.

Figure 22 is a screen shot of one embodiment of a component of the BPM Application 104, Financial (or GL) Analysis 303. This component helps speed reconciliations, period-end closings, and financial reporting and distribution by giving managers the information they use to analyze income statements, balance sheets, cash flows, key financial ratios, or currency rate conversions.

Types of financial reports available to end users include:

- Overview reports, such as income statement and balance sheet;
- Income statement analysis;
- Balance sheet analysis;
- Budget analysis;
- Analysis by legal entity;
- Analysis by management entity; and
- Operational reports, such as cost center and GL Analysis 303.

Figure 23 is a screen shot of an embodiment of another component of the BPM Application 104, Sales Analysis 301. This component allows users to analyze forecast accuracy and sales volume, calculate average deal size, and examine revenues and profitability, etc.

Types of sales reports available to end users include:

- Reports by customer, such as customer sales ranking or customer sales by region;
- Reports by product, such as order summary, or product sales ranking;
- Reports by sales organization, such as orders by reps or by country;
- Reports by profit; and
- Reports by quantity sold.

Figure 24 is a screen shot of an embodiment of another component of the BPM Application 104, Inventory Analysis 305. This component provides inventory managers with the information they use to understand supply chains and assess demand forecasting accuracy, inventory carrying costs, supplier performance, and warehouse performance, etc.

Types of inventory reports available to end users include:

- Inventory performance, such as stock level overview or profile of plants by stock level;
- Demand analysis, such as stock usage comparisons, or materials profile of demand;
- Material tracking;
- Vendor analysis by stock movements; and
- Resource activity, such as activity comparisons or plant/employee analysis.

Other components can be added to the BPM Application 104.

The BPM Application 104 is also based on comprehensive information about the business questions that users in specific functional areas face, including hundreds of function-specific questions common to business people in virtually all industries. The BPM Application 104 is designed for the enterprise and deployable by department, an approach that delivers value to end users and achieves enterprise-wide decision-making cohesion as quickly as possible.

The BPM Application 104 is created to serve as the information backbone of an organization. By building this backbone section by section and tying functional areas together with common shared dimensions, organizations generate a powerful decision-making support infrastructure that may grow as they grow.

Each component of the BPM Application 104 is designed from careful consideration of the business dimensions or measures that are common to each functional area of the business. Based on common terms and common information, these dimensions ensure that users in various departments approach business issues using the same references. Optimized for high-speed analysis and reporting, the BPM Application 104 incorporates a star schema data model that accelerates query performance and produces fast business insight.

The BPM Application may also provide packaged reports, OLAP cubes, and catalogs that offer out-of-the-box business insight. Users may also generate an array of reports—OLAP, relational, standard, *ad hoc*, time trend—to meet all information requirements, for all positions in the organization. Moreover, these reports are also easy to change. Decision makers can easily adapt them to manage, measure, and improve business performance in their functional areas, greatly reducing the burden on IT. Either way, knowledge workers gain key business insight and derive immediate productivity gains.

Furthermore, the BPM Application 104, which may be extended to include scorecarding and visualizations, provide the right report for the right users on the client platform of choice: e.g., Windows, Excel, or Web browser, whether users are LAN-based or working remotely.

Components of the BPM Application 104 are also designed for high scalability. Users may add new functional area data marts to further enhance their enterprise analysis and reporting. Users may broaden the source data collection points beyond their ERP system to gain a more complete view of the user's enterprise and customer relationships. Organizations may also increase the number of users that the system supports, accommodating corporate expansion without the growing pains.

The Power of Multi-Dimensional Analysis

The areas of analysis in the BPM Model 102 exemplified above may each be one of a series of pre-packaged data marts aimed at meeting the market demand for cross-functional business intelligence (BI) against data held within corporate ERP systems and other sources of data within the enterprise. Each component contributes to the core functional information requirements of an enterprise, taking its place within the BPM system "backbone" which is comprised of data marts targeting other core data including sales, distribution, billing, inventory, financial and cost accounting, and human resource management.

The Sales Analysis 301, AR Analysis 302, GL Analysis 303, AP Analysis 304, Inventory 305 Analysis, Procurement Analysis 306, and e-Commerce Analysis questions listed above represent a sampling of the type of valuable information available in the respective Analysis of the BPM system, information that business professionals should have to effectively manage their roles and responsibilities. The questions address the demand for information regarding the following:

- sales, shipping and billing portion of the sales cycle;
- demand for information regarding the organization's ability to meet collection expectations, customer profiling, and analyst performance;
- demand for information regarding the GL;
- demand for information regarding the organization's ability to meet payment expectations, vendor profiling, and analyst performance;
- demand for information regarding the investment in stock, process effectiveness, use of resources, and the effectiveness to meet the demand of internal and external customers;
- demand for information regarding the commodities purchased, vendor activity and performance, analysis of internal demand; and
- the demand for information regarding the e-commerce order taking process of the e-commerce cycle.

It should be noted that more analysis is possible. The multi-dimensional nature of the Sales, AR, GL, AP, Inventory, Procurement and e-Commerce Analyses components, along with the power of Cognos (TM) PowerPlay (TM) and Impromptu (TM) offers robust analysis

around any single question – further expanding the knowledge gained from the data extracted from the source ERP system.

The BPM Application also allows for ease of report generation.

Figures 25 to 37 illustrate the ease with which a series of reports may be generated from any starting point. For example, Figure 25 shows a screen shot of a report highlighting sales revenues over the past several years By Division (identified by arrow 2501). A user may decide that it would be interesting to view revenues over these periods by sales office within the sales organization. To generate this report, the user would simply move the cursor over the Sales Office folder, shown by circle 2502, then drag and drop it on the Divisions column shown within circled 2503.

This single step presents the user with a new report which represents sales revenues over time by sales office within, in this example, the Germany Sales Organization. This analysis may be taken one step further by dragging and dropping the materials file (identified by circle 2601 in Figure 26) to the nested row position in the report, (identified by thick vertical line 2602 within circle 2603). Figure 27 shows a screen shot of the result: a new report, identified by arrow 2701, highlighting how revenues are distributed by material groups across sales offices within, in this example, the German sales organization.

Thus, with three clicks, a user is able to view three reports, each of which offer sales related information. Similarly, each of these reports are only clicks away from more varied and valuable analysis.

The following is a listing of some of the reports and groupings of reports for some functional areas:

<u>Procurement Reporting</u>:

MATERIAL DEMAND ANALYSIS

- Internal Customer Profile and Ranking
- Material Demand Analysis and Trends
- Demand Rationalization

VENDOR PROFILE

- Vendor Ranking
- Vendor Expenditure Overview
- Contract Activity Analysis
- Contract Analysis
- Vendor – Material Rationalization
- Vendor Profiling

OPERATIONAL EFFECTIVENESS

- Procurement Activity Overview
- Buyer Account Management Status
- Buyer Comparisons
- Procurement Process Efficiency
- Buyer Activity Overview
- Contract Usage Analysis
- Release Strategies

OPERATIONAL REPORTING

- Document Lists

Inventory Reporting:

INVENTORY PERFORMANCE

- Stock Level Overview and Comparisons
- Stock Level Analysis (Plant, Material)
- Detailed Storage Stock Levels

DEMAND ANALYSIS

- Stock Usage Overview and Comparisons
- Stock Usage Analysis
- Detailed List of Usage

MATERIAL TRACKING

- Material Movement Overview and Comparisons
- Movements Analysis

RESOURCE ACTIVITY

- Resource Activity Overview
- Activity Comparisons
- Plant/Employee Analysis

STOCK ACCURACY

- Stock Overview
- Stock Comparisons

- Stock Analysis

RESERVATIONS
- Reservations Overview
- Reservations Comparisons
- Reservations Analysis

FORECASTS
- Stock Forecast Overview and Comparisons
- Stock Forecast Analysis
- Stock Forecasts Profile

VENDOR ANALYSIS (MOVEMENTS)
- Vendor Overview and Comparisons
- Vendor Analysis
- Vendor Activity Profile

AP Reporting:

AP MANAGEMENT OVERVIEW
- Ageing Overview
- Payments Analysis
- Quality of Accounts Receivable
- Bad Debt Analysis

VENDOR ACCOUNT MANAGEMENT
- Vendor A/P Overview
- Vendor Ageing
- Top Ten Vendor Activity Report
- Overdue Accounts
- Vendor Account Overview
- Vendor Transaction Summary
- Vendor Activity Analysis
- Analysis of Adjustments
- Vendor Profile Status

VENDOR PAYABLES SCORECARDING
- Vendor Cost Analysis
- Discount Analysis

OPERATIONAL EFFECTIVENESS
- Organizational Overview
- Account Management Status

- Analyst Activity Overview
- Analyst Profile Overview
- Analyst Profile Status
- Document Flow Report

CASH OUTFLOW MANAGEMENT

- Payment Schedule
- Cash Outflow Forecasts

GL Reporting:

INCOME STATEMENT ANALYSIS

- Income Statement Time Comparisons
- Vertical Analysis
- Detailed Income Statement
- Income Statement Budget Variances

BALANCE SHEET ANALYSIS

- Balance Sheet Time Comparisons
- Balance Sheet Time Trends
- Detailed Balance Sheet
- Balance Sheet Budget Variance

FINANCIAL/LEGAL ENTITY ANALYSIS

- Company, Profit and Cost Center Comparison of Financial Reports
- Company, Profit Center and Cost Center Rankings and Comparisons
- Ratio Trends

BUDGET ANALYSIS

- Customer Profitability Analysis
- Customer Cost Analysis
- Discount Analysis

OPERATIONAL REPORTS

- Cost Center Analysis
- Account Analysis
- Trial Balance
- General Ledger Detail

KEY FINANCIAL RATIOS

Multi-dimensional analysis of key financial ratios:

- Leverage Ratios including Debt to Asset and Times Interest Earned
- Liquidity Ratios including Current, Quick Ratio, Fixed Asset Turnover, Total Asset Turnover
- Profitability or Efficiency Ratios including Profit Margin, Inventory Turnover,

Return on Assets, Return on Equity

Sales Reporting:

SALES ORDER LIFE CYCLE

- Sales Orders Overview and Comparison
- Sales Orders Analysis
- Sales Order List By Customer
- Customer Order Profiles

CUSTOMER BUYING TRENDS

- Customer Buying Overview and Comparisons
- Trends Analysis
- Billings List By Customer
- Customer Ranking

SALES/PRODUCT PERFORMANCE

- Sales and Product Overview/Comparison
- Sales and Product Performance Analysis
- Sales Office and Sales Rep Performance Profiles
- Product Sales List
- Product Performance Profile

SHIPPING CHANNEL TREND/DRIVERS

- Shipping Overview and Analysis
- Shipping Channel Comparisons
- Shipping Performance Overview/Comparisons
- Shipping Profile and Document List by Product

CHANNEL PERFORMANCE

- Channel Overview and Comparisons
- Channel Performance Analysis
- Billing List by Channel; Channel Profile

DELIVERY/ON-TIME DELIVERY ANAYSIS

- Delivery Effectiveness Overview and Comparisons
- Delivery Effectiveness Analysis
- Shipping Point Profile

AR Reporting:

AR MANAGEMENT OVERVIEW

- Ageing Overview
- Collection Analysis

- Quality of Accounts Receivable
- Bad Debt Analysis

CUSTOMER COLLECTION MANAGEMENT

- Customer A/R Overview
- Customer Ageing
- Top Ten Customer Activity Report
- Overdue Accounts

CUSTOMER ACCOUNT MANAGEMENT

- Customer Account Overview
- Customer Transaction Summary
- Customer Activity Analysis
- Analysis of Adjustments
- Customer Profile Status

CUSTOMER SCORECARDING

- Customer Profitability Analysis
- Customer Cost Analysis
- Discount Analysis

OPERATIONAL EFFECTIVENESS

- Organizational Overview
- Account Management Status
- Analyst Activity Overview
- Analyst Profile Overview
- Analyst Performance Comparison
- Document Flow Report

AR AND SALES ANALYSIS

- Accounts Receivable and Sales Related KPIs
- Customer AR Sales Overview

While specific embodiments of the present invention have been described, various modifications and substitutions may be made to such embodiments. Such modifications and substitutions are within the scope of the present invention, and are intended to be covered by the following claims.

WHAT IS CLAIMED IS:

1. A business performance management model for providing foundation for business performance management for an organization having a plurality of functions, the business performance management model comprising:

a set of functional areas of analysis, each functional area corresponding to a group of functions of the organization, and having one or more elements for representing the corresponding functions;

a set of dimensions qualitatively describing elements of the functional areas; and

relation indications indicating interrelation among the functional areas and the dimensions.

2. The business performance management model as claimed in claim 1, wherein the relation indications are provided so that common dimensions are shared by multiple function areas.

3. The business performance management model as claimed in claim 1, wherein the elements of each functional area include key performance indicators, measures, dimension identifications and/or attributes.

4. The business performance management model as claimed in claim 1, wherein the functional areas represent fundamental functions of the organization for analysing business performance of the organization.

5. A method for creating a business performance management model for providing foundation for business performance management for an organization having a plurality of functions, the method comprising steps of:

analysing functions of multiple organizations;

identifying a set of functional areas of analysis which are useful to analyse business performance of the organizations, each functional area having one or more elements for representing the corresponding functions;

identifying a set of dimensions qualitatively describing elements of the functional areas; and

providing interrelation among the functional areas and the dimensions.

6. The method as claimed in claim 5, wherein the step of providing interrelation comprises steps of:

determining common dimensions used by multiple functional areas;

providing relation indications between the functional areas and dimensions so that each common dimension is shared by its respective multiple function areas.

7. The method as claimed in claim 5, wherein the step of analysing comprises a step of analysing questions to be answered to manage the business performance of the organizations.

8. A data model constructed based on the business performance management model claimed in claim 5.

9. A data model for representing an organization having a plurality of groups of functions, the data model comprising:

a plurality of preset groups of tables, each group of tables representing each group of functions; and

preset joins connecting the tables indicating interrelation of the tables to represent the relationship among the functions.

10. The data model as claimed in claim 9, wherein each group of tables having one or more tables, each table describing one or more preset attributes of the respective function.

11. The data model as claimed in claim 10, wherein the present joins are provided based on the attributes.

12. The data model as claimed in claim 9, wherein each group of tables is associated with a data mart of the respective function.

13. A method for creating a data model for representing an organization having a plurality of groups of functions, the method comprising steps of:

obtaining attributes of the functions from the organization by presenting a predetermined set of questions;

analysing the attributes of the functions; and

creating a data model based on the analysis.

14. The method as claimed in claim 13, wherein the analysing step comprises a step of identifying relationship among the attributes.

15. The method as claimed in claim 14, wherein the creating step comprises steps of:

grouping the attributes based on the identified relationship into tables; and
joining the tables to represent the identified relationship.

16. The method as claimed in claim 13 further comprising steps of:
extracting data from multiple data marts; and
loading the extracted data into the data model.

17. The method as claimed in claim 16 further comprising a step of:
transforming the extracted data into a form loadable into the data model.

18. The method as claimed in claim 13, wherein the method comprises steps of:
determining the set of business questions that establish the best business practices for managing business performance within an organization having a plurality of groups of functions, determining and obtaining the Business Performance Management measures, key performance indicators and attributes from those questions through a process of business question decomposition.

19. A method for analysing an organization having a plurality of groups of functions, the method comprising steps of:
preparing a data model representing interrelation of the groups of functions; and
obtaining information from the data model using the interrelation among the groups of functions.

20. The method as claimed in claim 19, wherein the preparing step comprises a steps of:
obtaining attributes of each group of functions;
analysing interrelation of the attributes of the functions; and
creating the data model based on the analysis.

21. A business performance management application for managing business performance of an organization having a plurality of functions, the business performance management application comprising:
a predefined data model representing the functions of the organization;
extracting means for extracting and mapping source data into the data model;
reporting means for providing reports on data stored in the data model; and
an operational framework for providing control of the operation of the data model, the extracting means and the reporting means.

22. The business performance management application as claimed in claim 21, wherein the extracting means comprises an Extract, Transform and Load (ETL) software program for extracting data from an enterprise resource planning system, transforming the data and loading the data into the data model.

23. The business performance management application as claimed in claim 21, wherein the operational framework couples the data model, the extracting means and the reporting means as a single product.

24. The business performance management application as claimed in claim 21, wherein the operational framework has a customizing function to allow users to customize the business performance management application.

25. The business performance management application as claimed in claim 21, wherein the operational framework has a console for users to customize the business performance management application.

26. A console for managing a data model for representing an organization having a plurality of groups of functions, the console comprising:

means for installing a predefined data model; and

means for setting a sequence of extraction of information from each function to load the data model.

27. A method for creating a report for use by an organization having a plurality of groups of functions, the method comprising steps of:

accessing a data model representing interrelation of the functions;

obtaining information from the data model; and

compiling a report based on the obtained information.

28. The method as claimed in claim 27, wherein the accessing step comprises a step of using a predefined form of a report.

29. The method as claimed in claim 27, wherein the obtaining step comprises a step of combining information from different groups of functions.

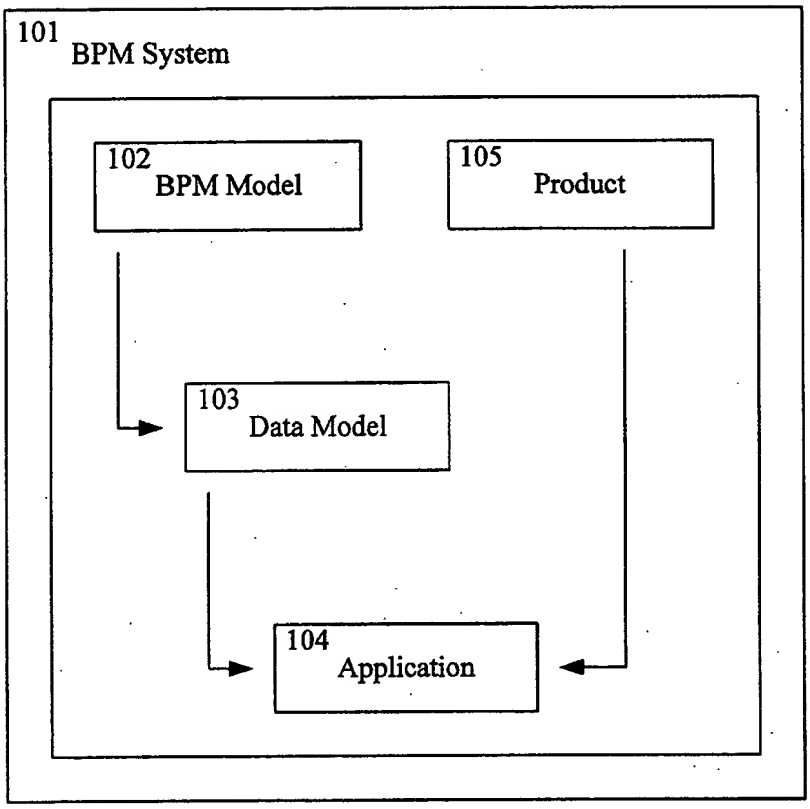
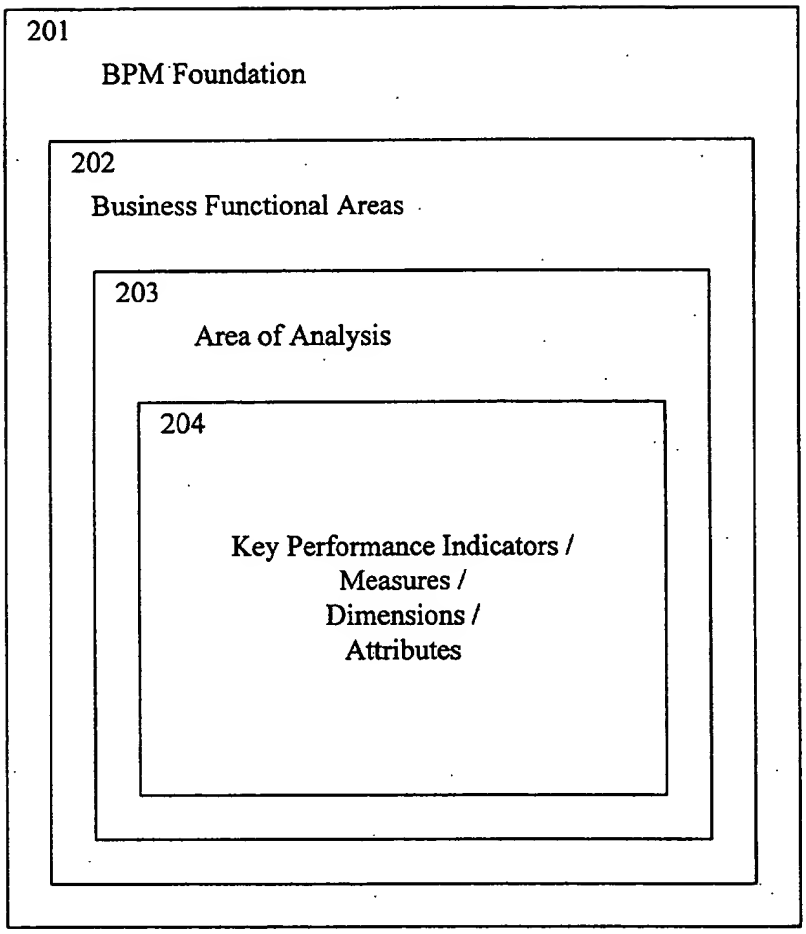

101
BPM System
102
BPM Model
105
Product
103
Data Model
104
Application

Figure 1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BPM Foundation
202
Business Functional Areas
203
Area of Analysis
204
Key Performance Indicators /
Measures /
Dimensions /
Attributes

Figure 2

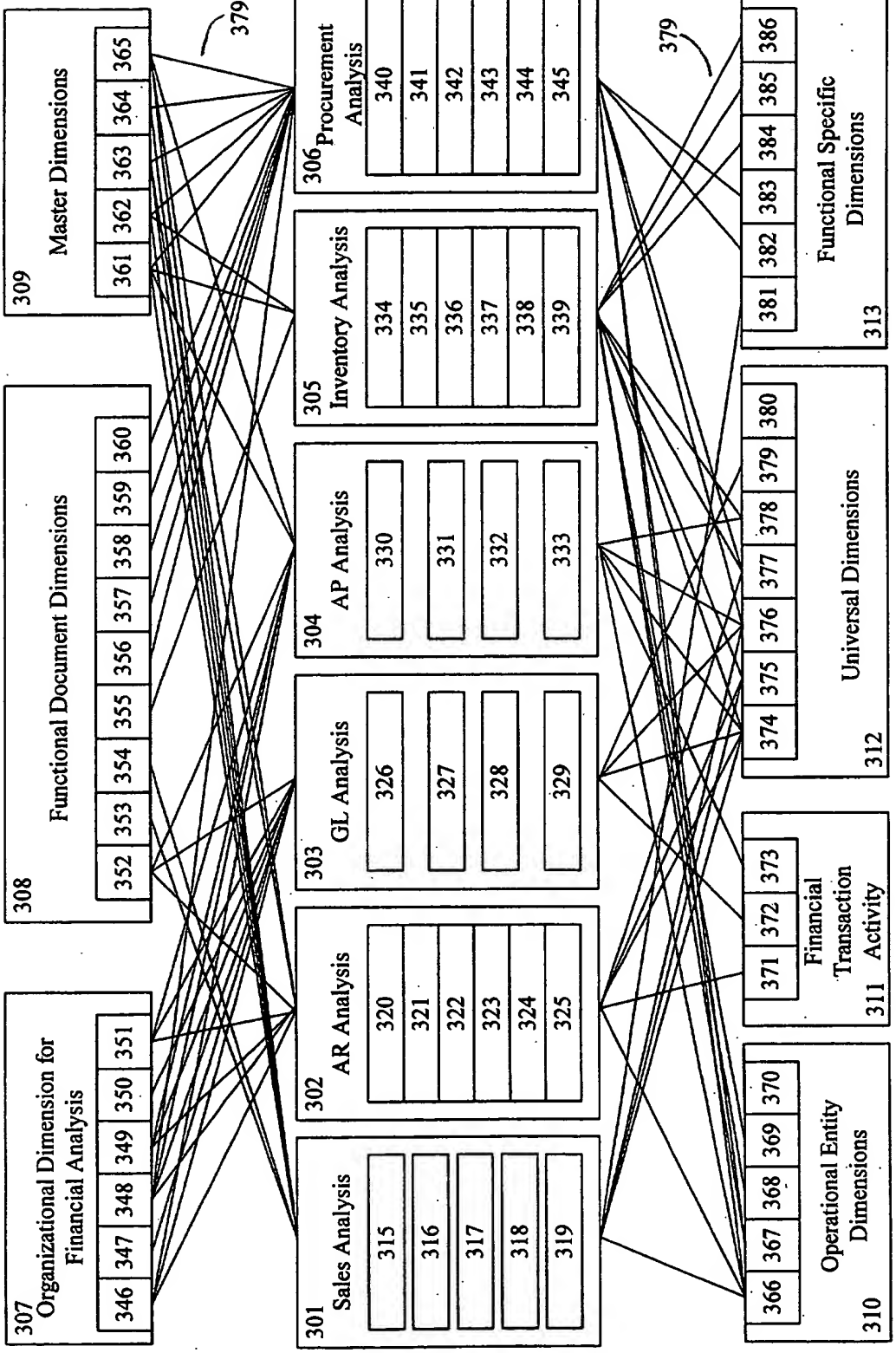
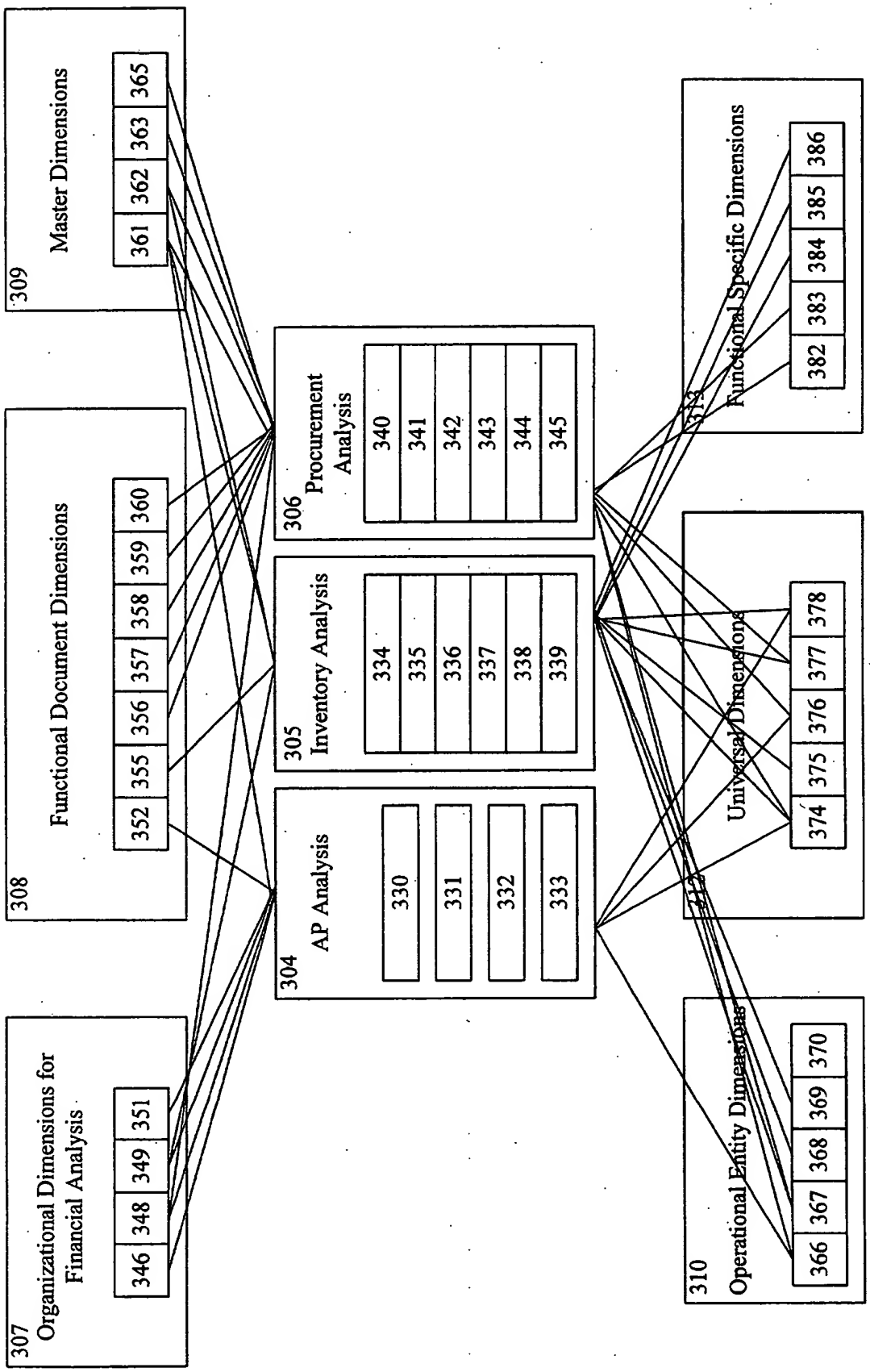

307 Organizational Dimension for Financial Analysis
346 347 348 349 350 351
308 Functional Document Dimensions
352 353 354 355 356 357 358 359 360
309 Master Dimensions
361 362 363 364 365
379
301 Sales Analysis
315 316 317 318 319
302 AR Analysis
320 321 322 323 324 325
303 GL Analysis
326 327 328 329
304 AP Analysis
330 331 332 333
305 Inventory Analysis
334 335 336 337 338 339
306 Procurement Analysis
340 341 342 343 344 345
310 Operational Entity Dimensions
366 367 368 369 370
311 Financial Transaction Activity
371 372 373
312 Universal Dimensions
374 375 376 377 378 379 380
313 Functional Specific Dimensions
381 382 383 384 385 386

Figure 3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Organizational Dimensions for Financial Analysis
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308
Functional Document Dimensions
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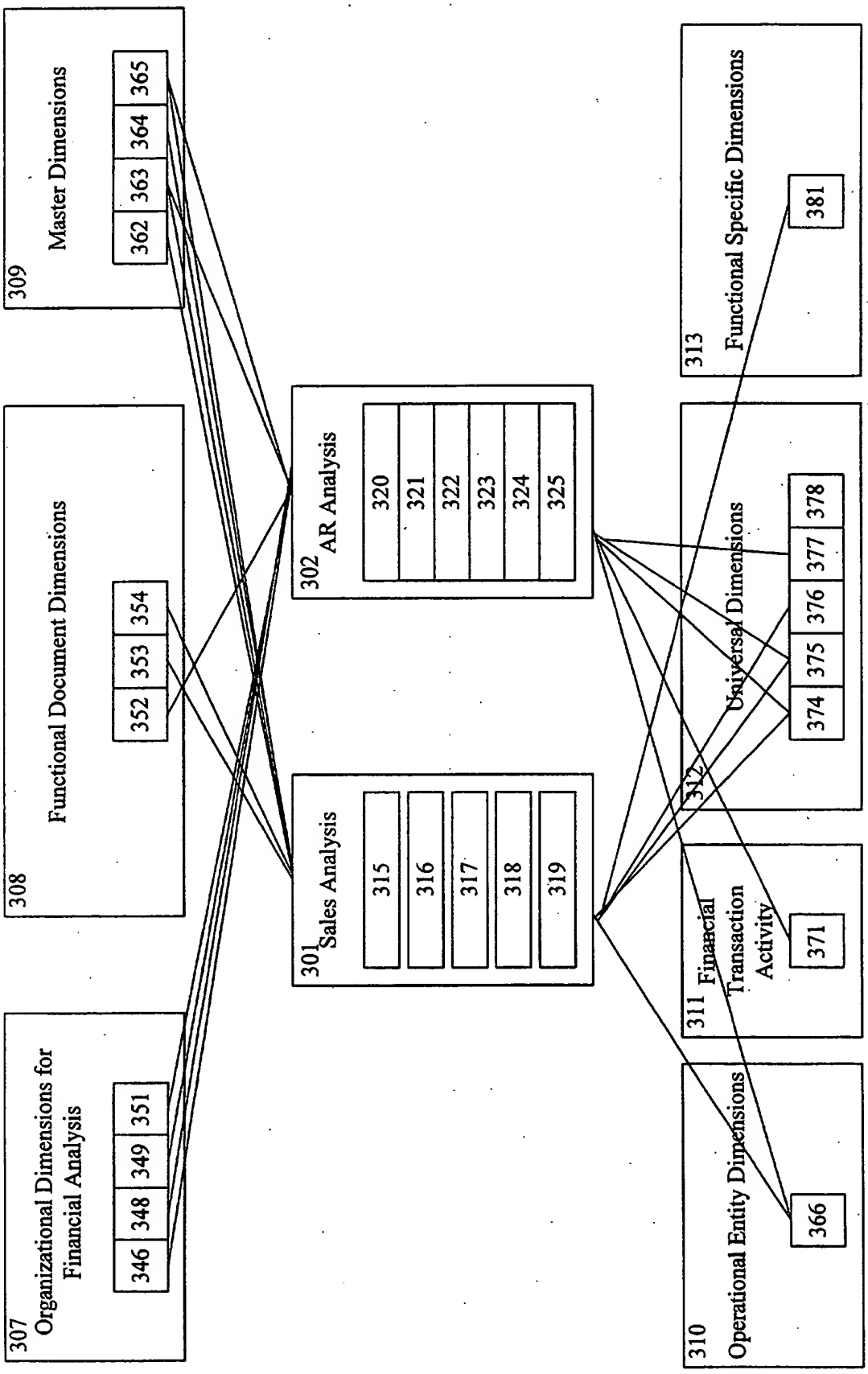
356
357
358
359
360
309
Master Dimensions
361
362
363
365
304
AP Analysis
330
331
332
333
305
Inventory Analysis
334
335
336
337
338
339
306
Procurement Analysis
340
341
342
343
344
345
310
Operational Entity Dimensions
366
367
368
369
370
Universal Dimensions
374
375
376
377
378
Functional Specific Dimensions
382
383
384
385
386

Figure 4


307
Organizational Dimensions for Financial Analysis
346
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Functional Document Dimensions
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353
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309
Master Dimensions
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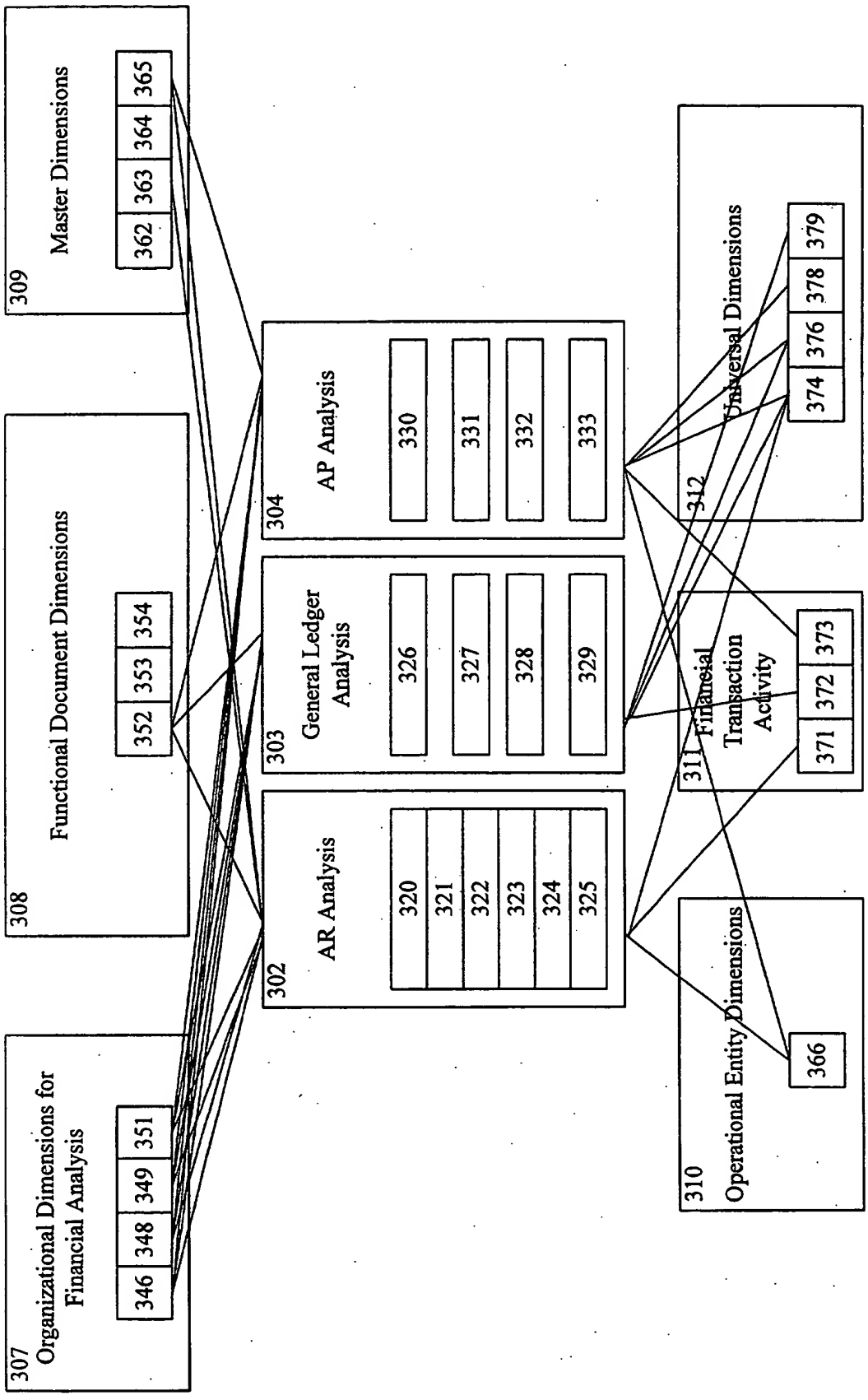
363
364
365
301
Sales Analysis
315
316
317
318
319
302
AR Analysis
320
321
322
323
324
325
310
Operational Entity Dimensions
366
311
Financial Transaction Activity
371
312
Universal Dimensions
374
375
376
377
378
313
Functional Specific Dimensions
381

Figure 5


307
Organizational Dimensions for Financial Analysis
346
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349
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308
Functional Document Dimensions
352
353
354
309
Master Dimensions
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363
364
365
302
AR Analysis
320
321
322
323
324
325
303
General Ledger Analysis
326
327
328
329
304
AP Analysis
330
331
332
333
310
Operational Entity Dimensions
366
311
Financial Transaction Activity
371
372
373
312
Universal Dimensions
374
376
378
379

Figure 6

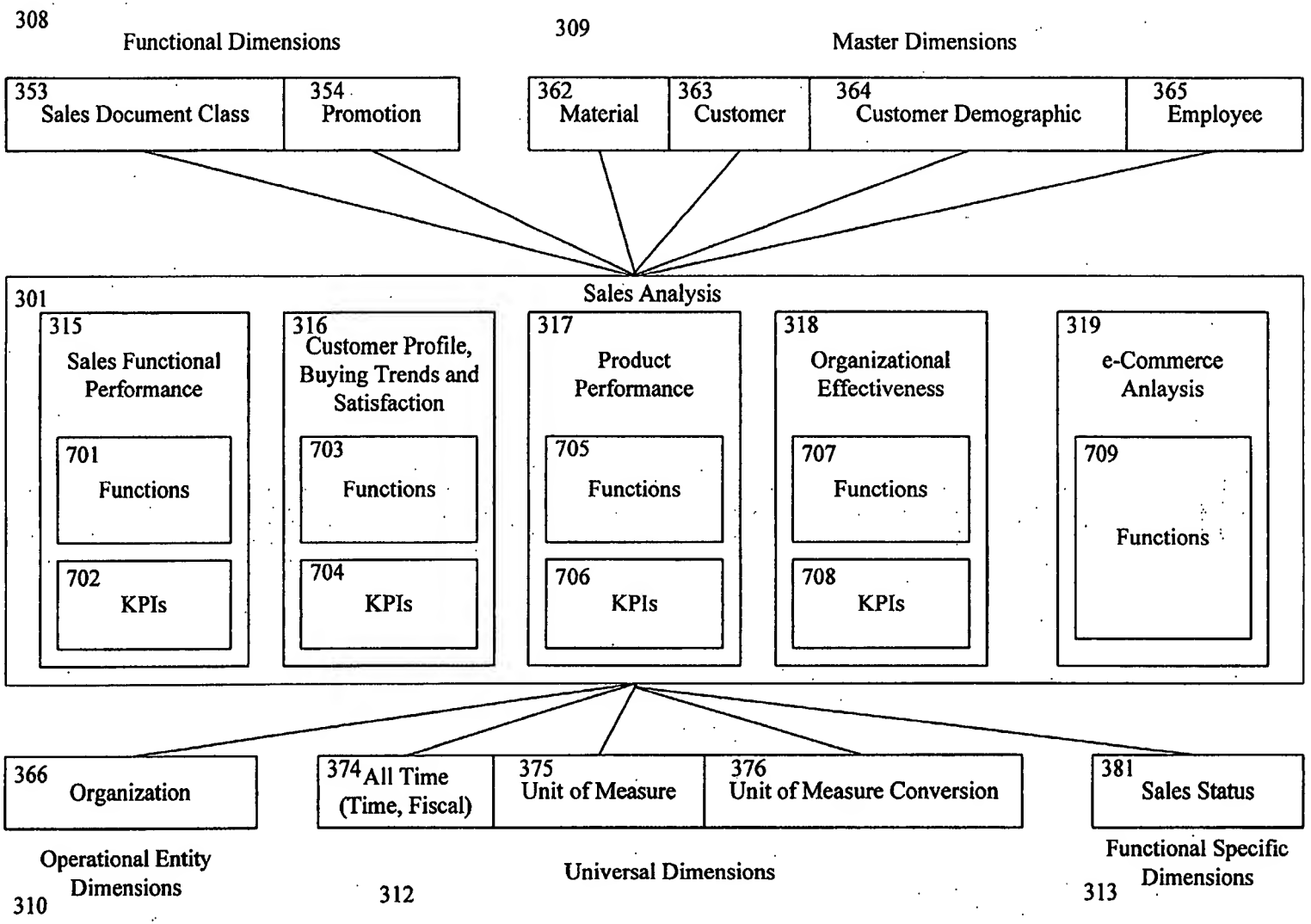


Figure 7

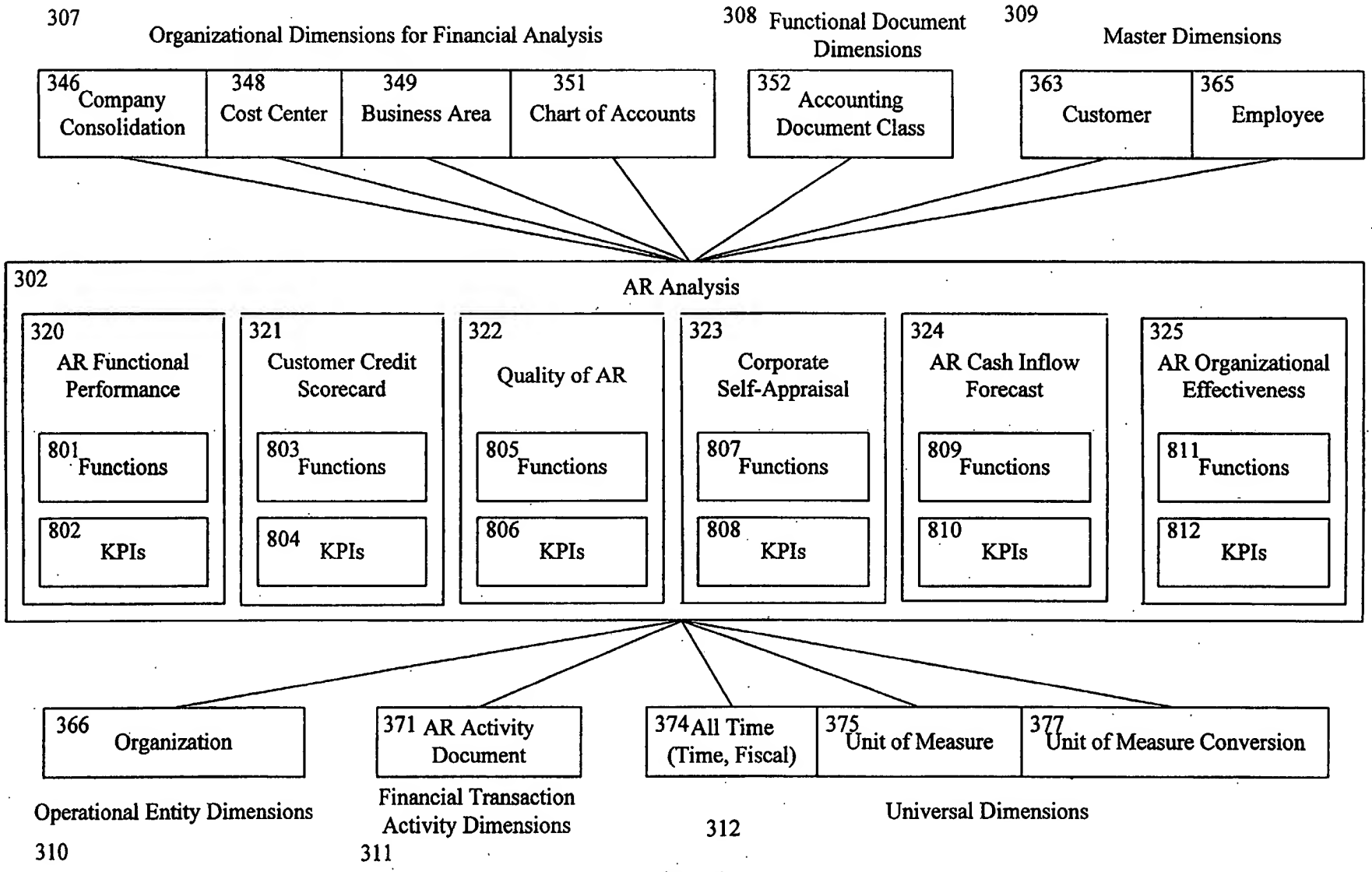


Figure 8

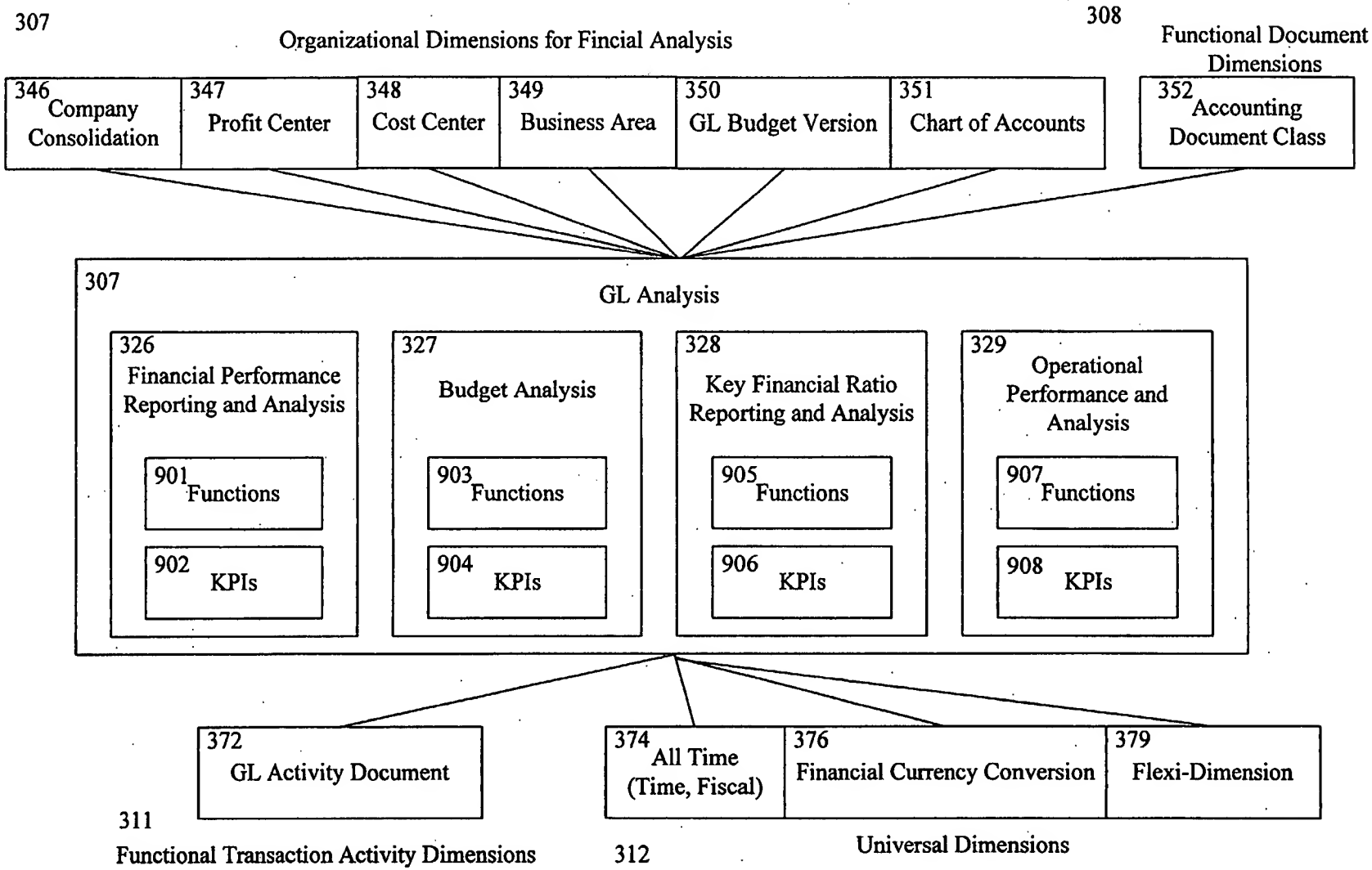


Figure 9

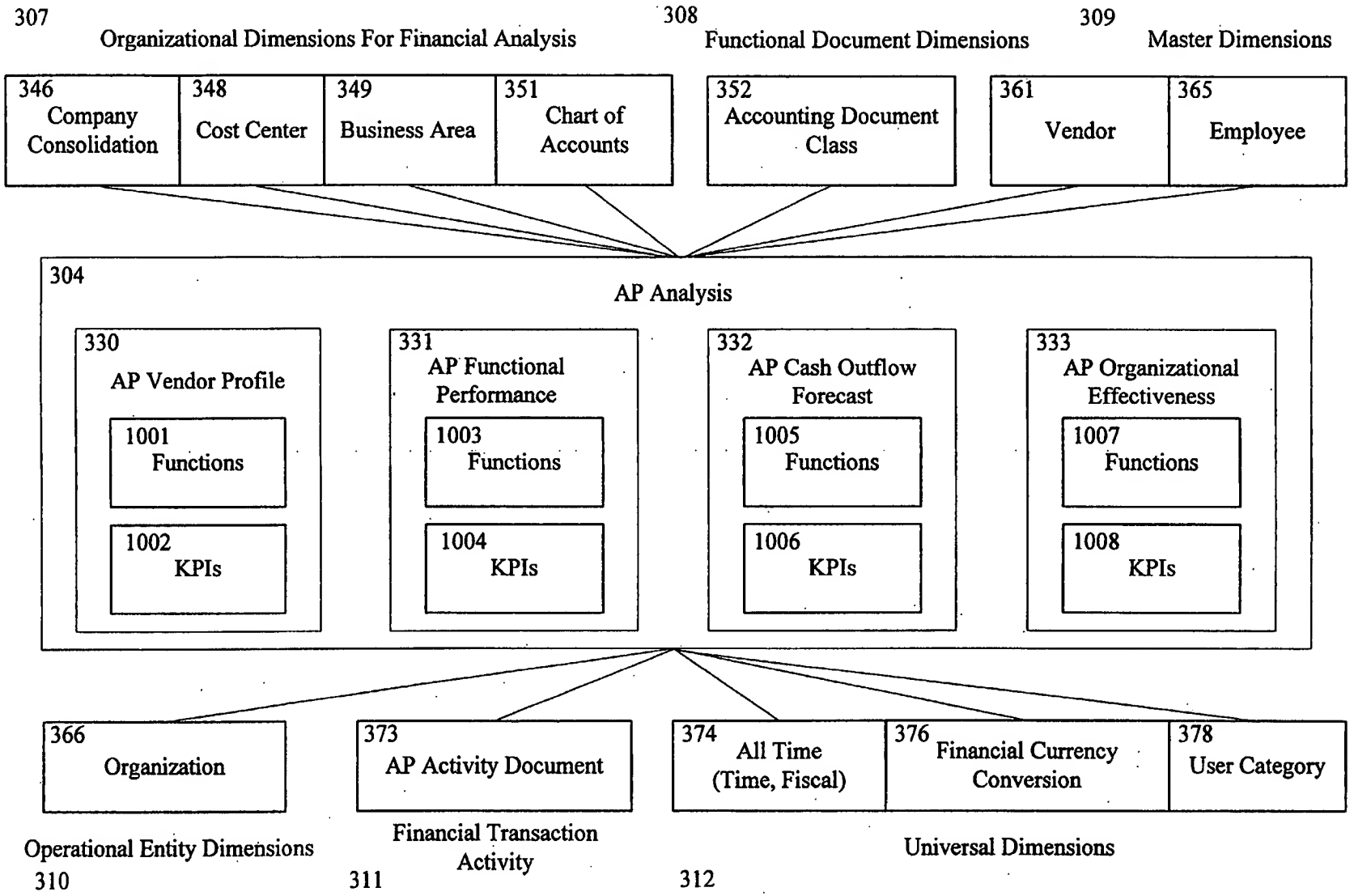
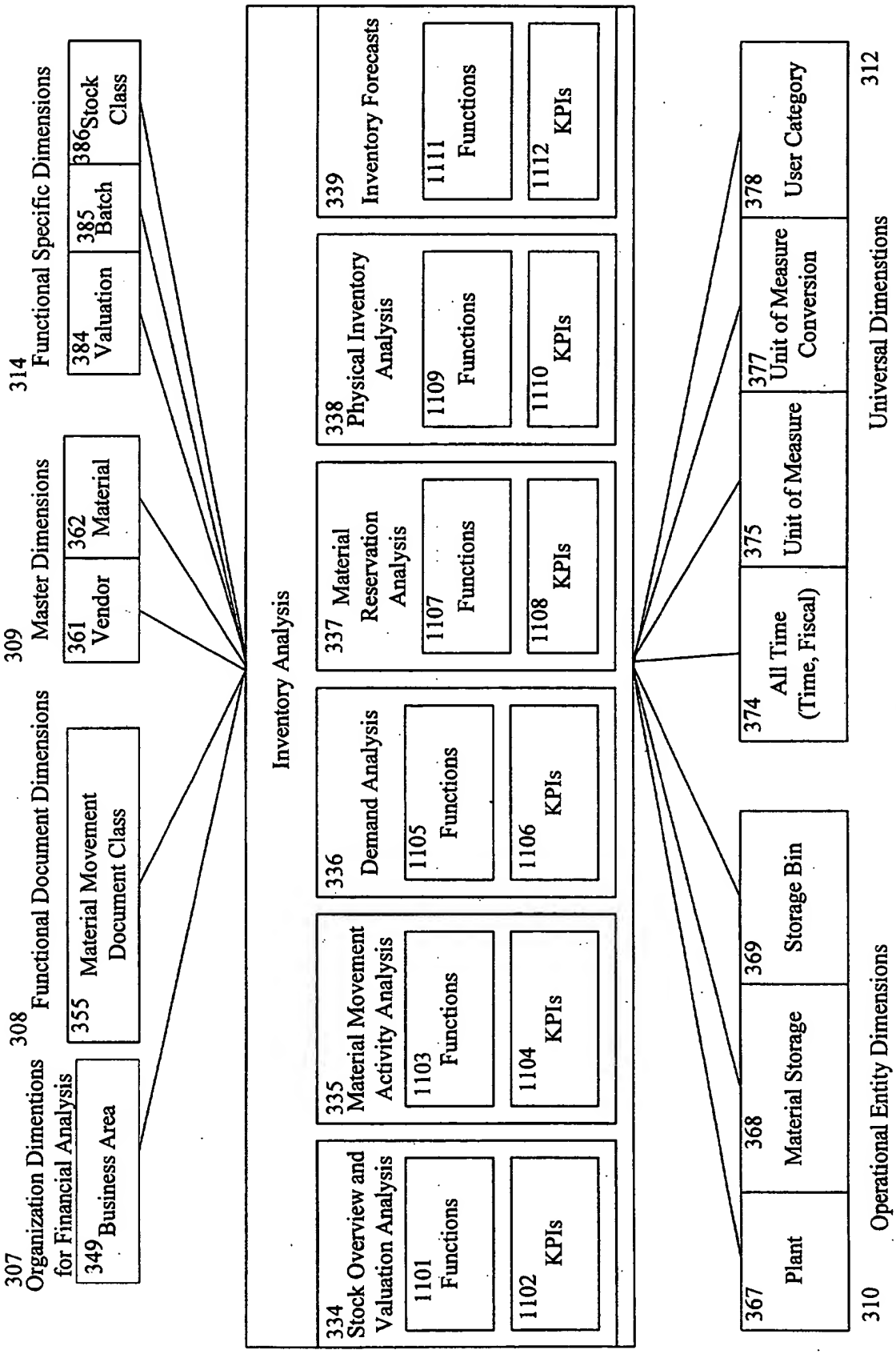


Figure 10


307
Organization Dimentions for Financial Analysis
349 Business Area
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Functional Document Dimensions
355 Material Movement Document Class
309
Master Dimensions
361 Vendor
362 Material
314
Functional Specific Dimensions
384 Valuation
385 Batch
386 Stock Class
Inventory Analysis
334 Stock Overview and Valuation Analysis
1101 Functions
1102 KPIs
335 Material Movement Activity Analysis
1103 Functions
1104 KPIs
336 Demand Analysis
1105 Functions
1106 KPIs
337 Material Reservation Analysis
1107 Functions
1108 KPIs
338 Physical Inventory Analysis
1109 Functions
1110 KPIs
339 Inventory Forecasts
1111 Functions
1112 KPIs
367 Plant
368 Material Storage
369 Storage Bin
374 All Time (Time, Fiscal)
375 Unit of Measure
377 Unit of Measure Conversion
378 User Category
310 Operational Entity Dimensions
Universal Dimenstions 312

Figure 11

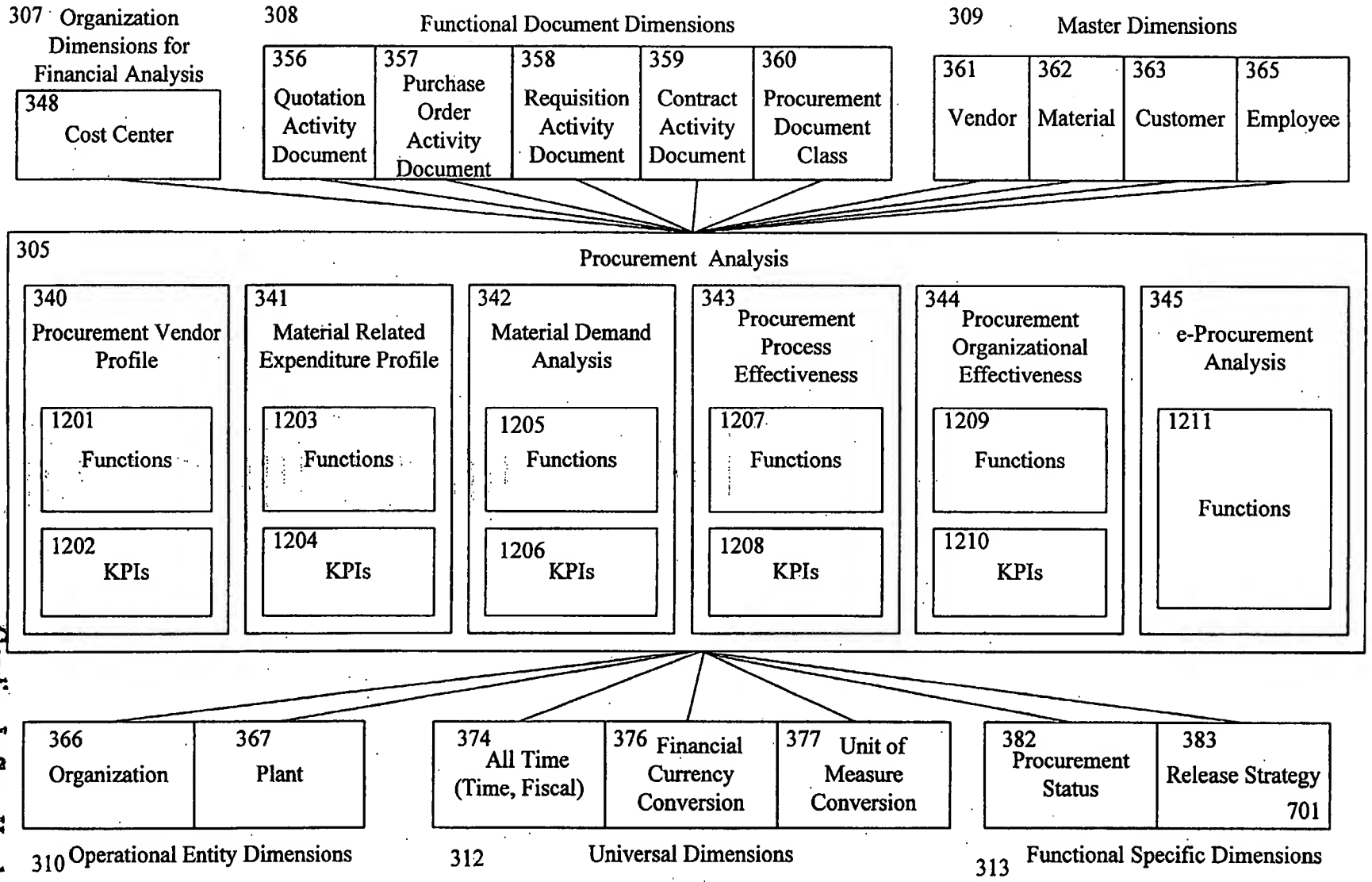


Figure 12

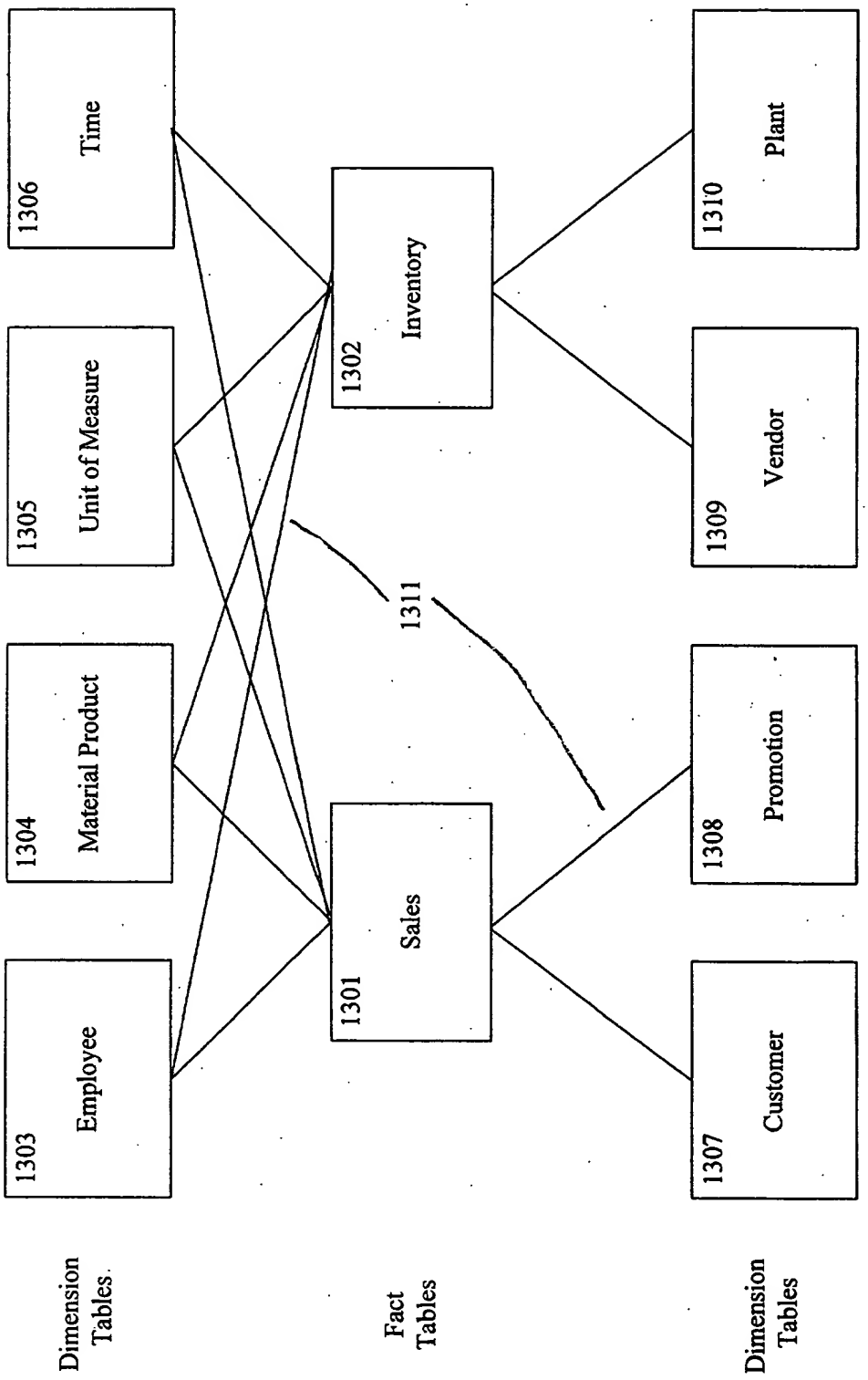

1306
Time
1305
Unit of Measure
1304
Material Product
1303
Employee
1302
Inventory
1311
1301
Sales
1310
Plant
1309
Vendor
1308
Promotion
1307
Customer
Dimension Tables
Fact Tables
Dimension Tables

Figure 13

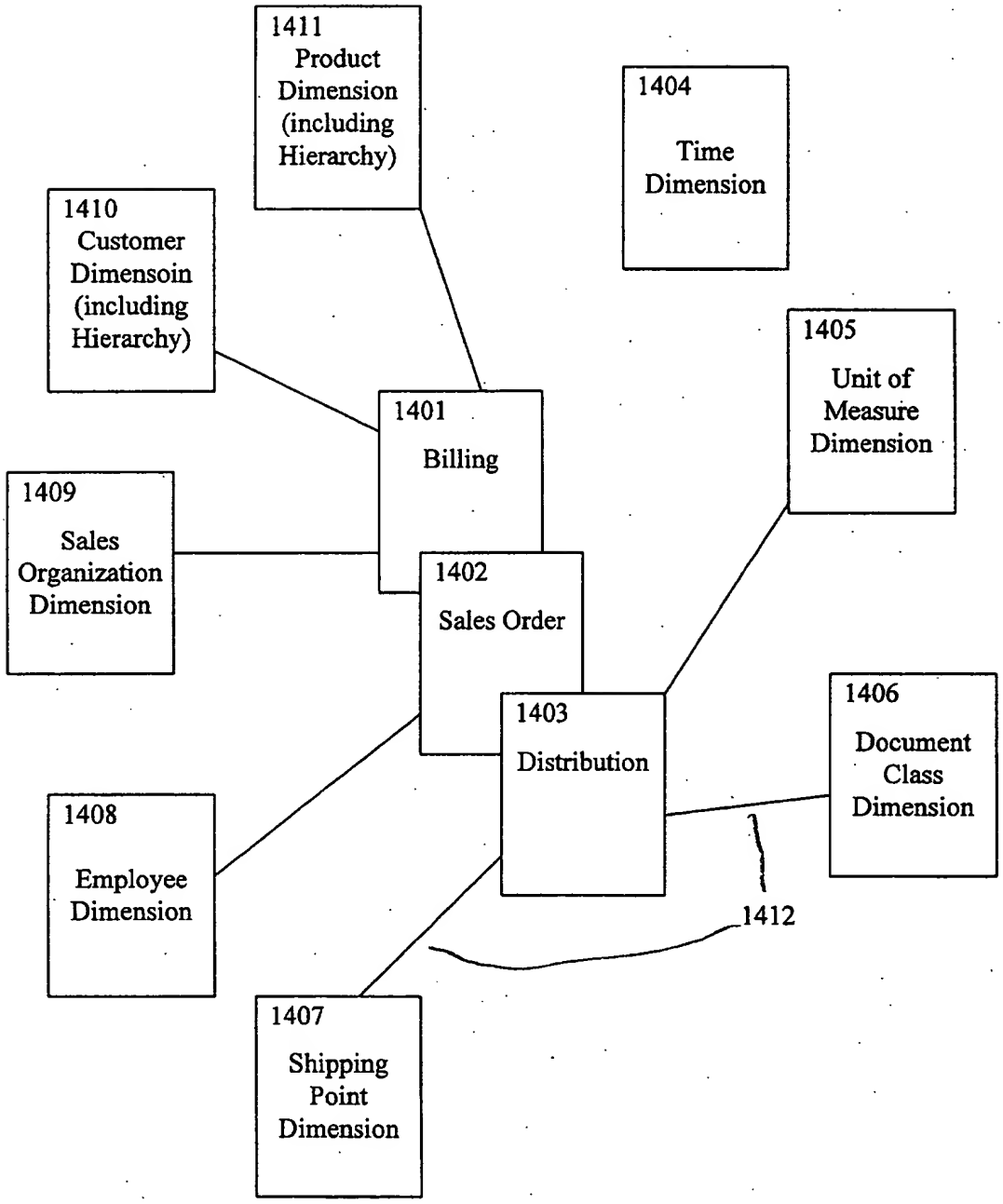
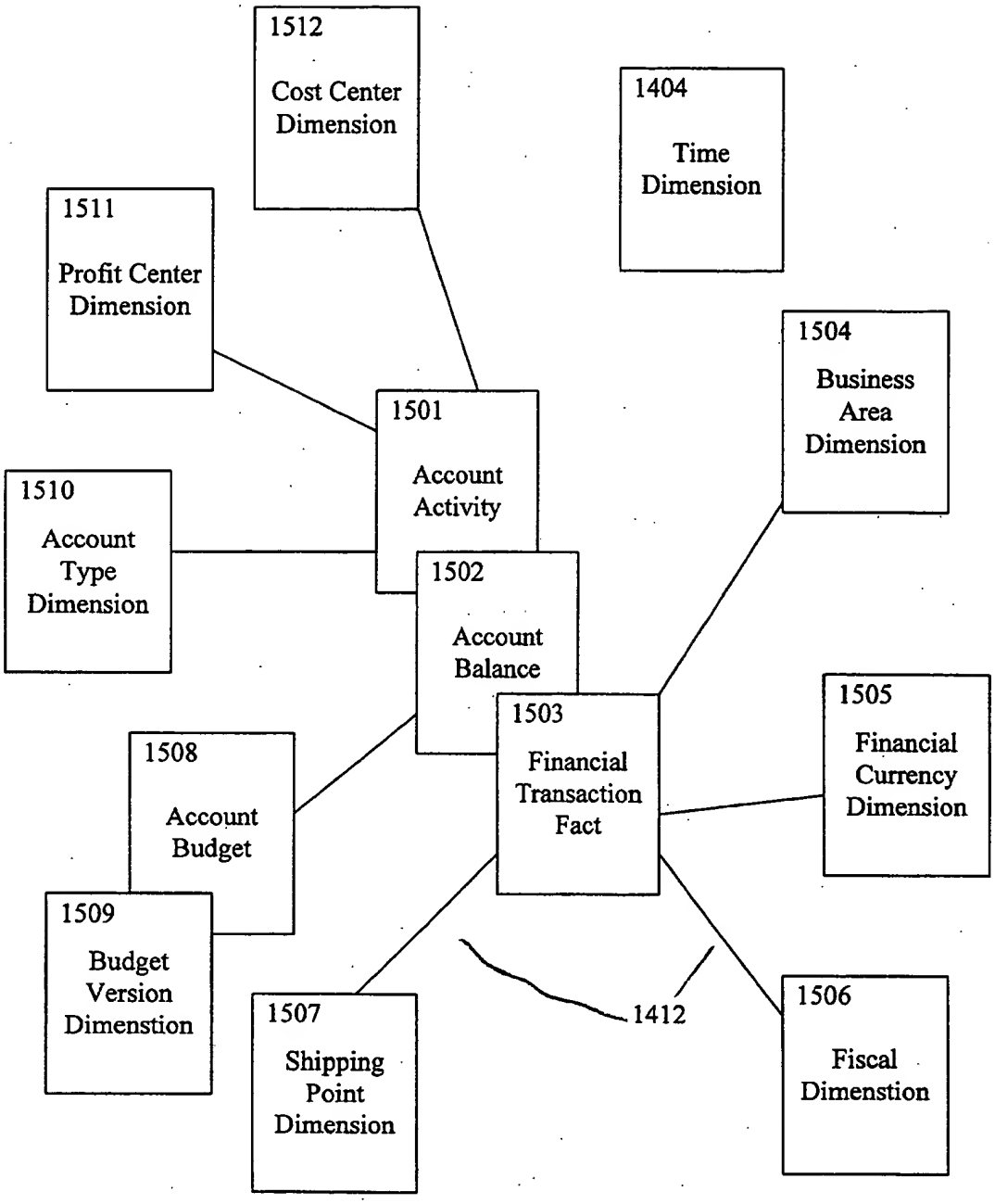


Figure 14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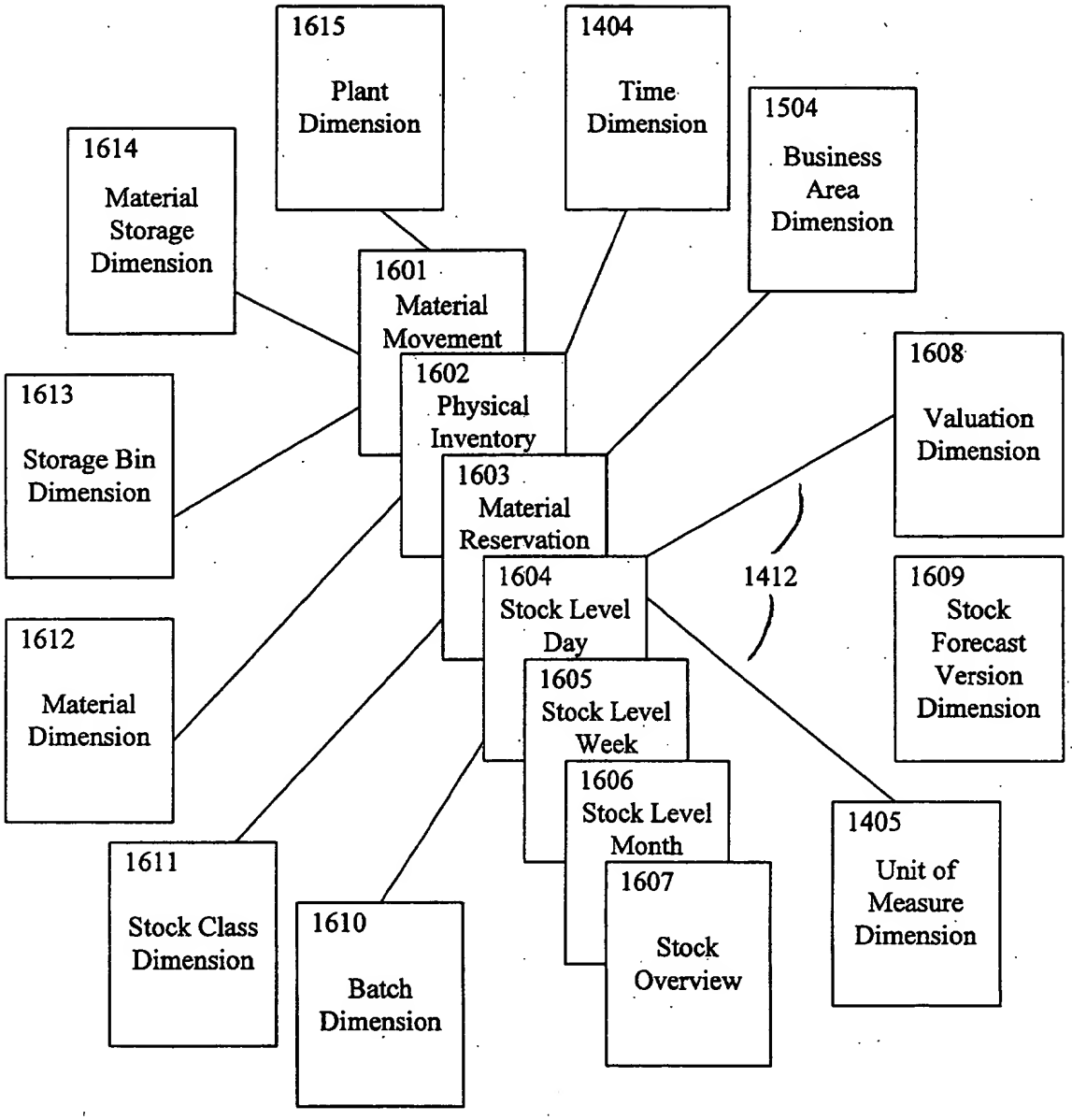
Cost Center Dimension
1404
Time Dimension
1511
Profit Center Dimension
1504
Business Area Dimension
1501
Account Activity
1510
Account Type Dimension
1502
Account Balance
1503
Financial Transaction Fact
1505
Financial Currency Dimension
1508
Account Budget
1509
Budget Version Dimenstion
1507
Shipping Point Dimension
1412
1506
Fiscal Dimenstion

Figure 15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Plant Dimension
1404
Time Dimension
1504
Business Area Dimension
1614
Material Storage Dimension
1601
Material Movement
1602
Physical Inventory
1603
Material Reservation
1604
Stock Level Day
1605
Stock Level Week
1606
Stock Level Month
1607
Stock Overview
1608
Valuation Dimension
1609
Stock Forecast Version Dimension
1412
1613
Storage Bin Dimension
1612
Material Dimension
1611
Stock Class Dimension
1610
Batch Dimension
1405
Unit of Measure Dimension

Figure 16

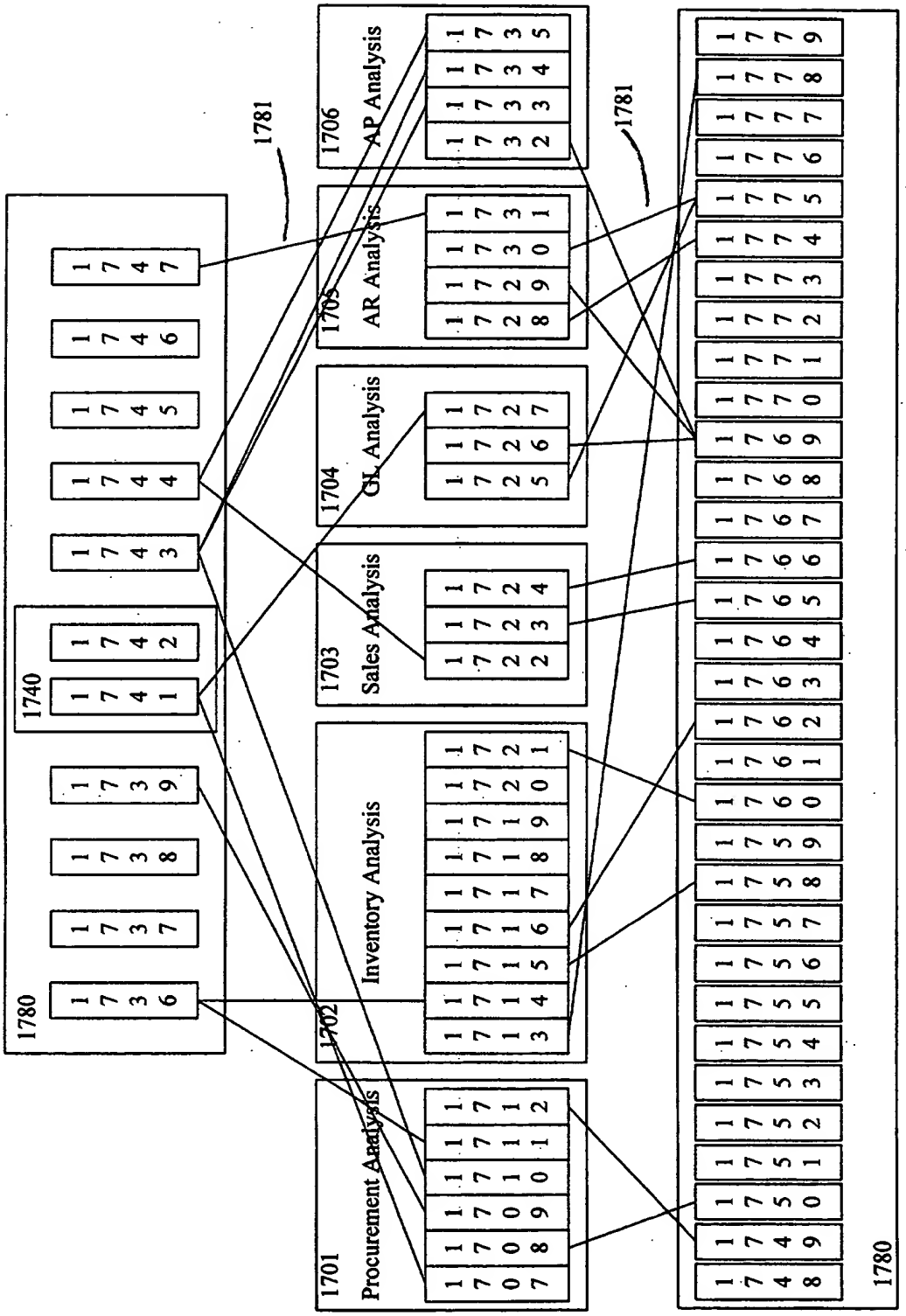

1780
1740
1781
1701
Procurement Analysis
1702
Inventory Analysis
1703
Sales Analysis
1704
GL Analysis
1705
AR Analysis
1706
AP Analysis
1781
1780

Figure 17

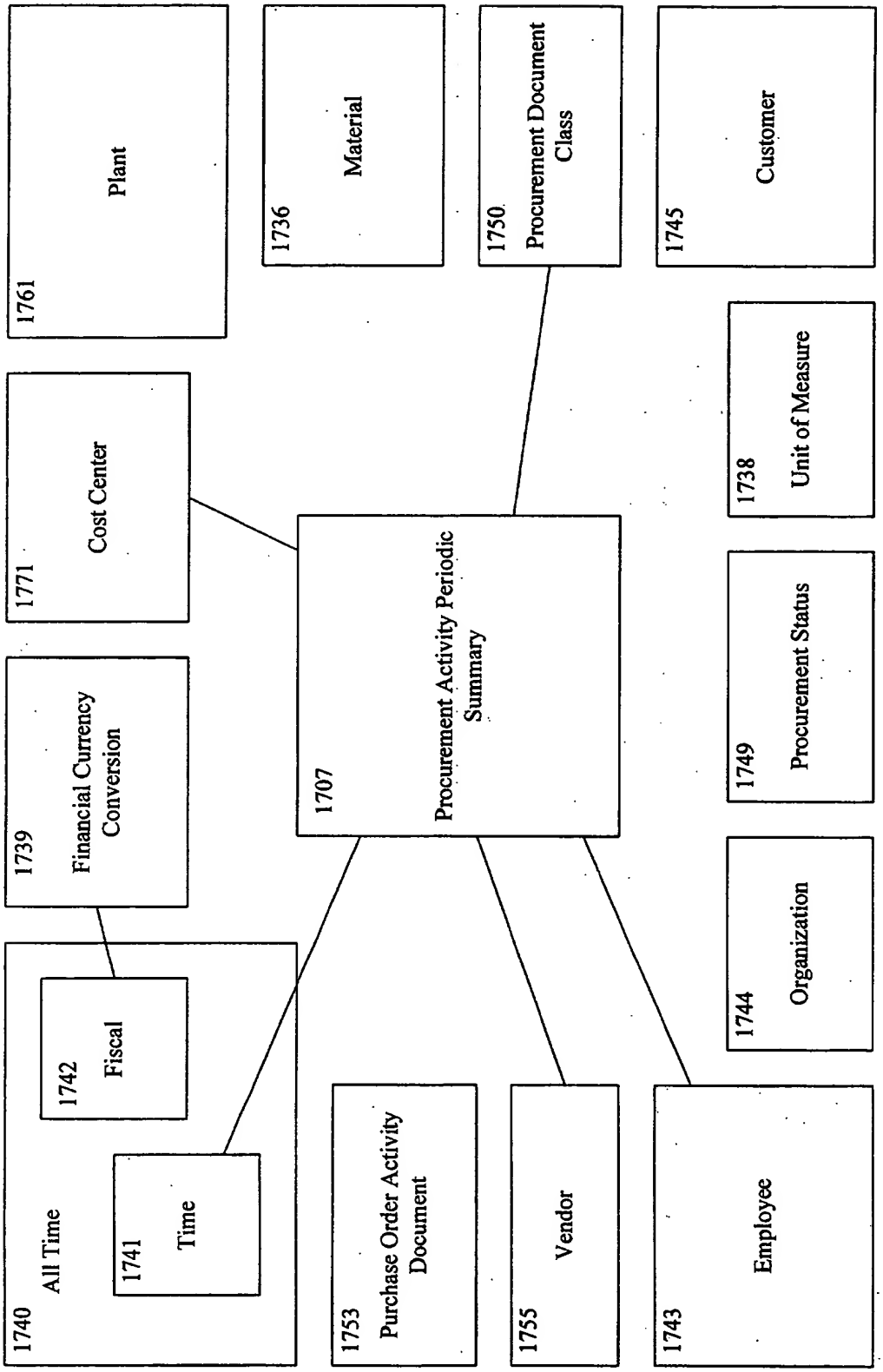
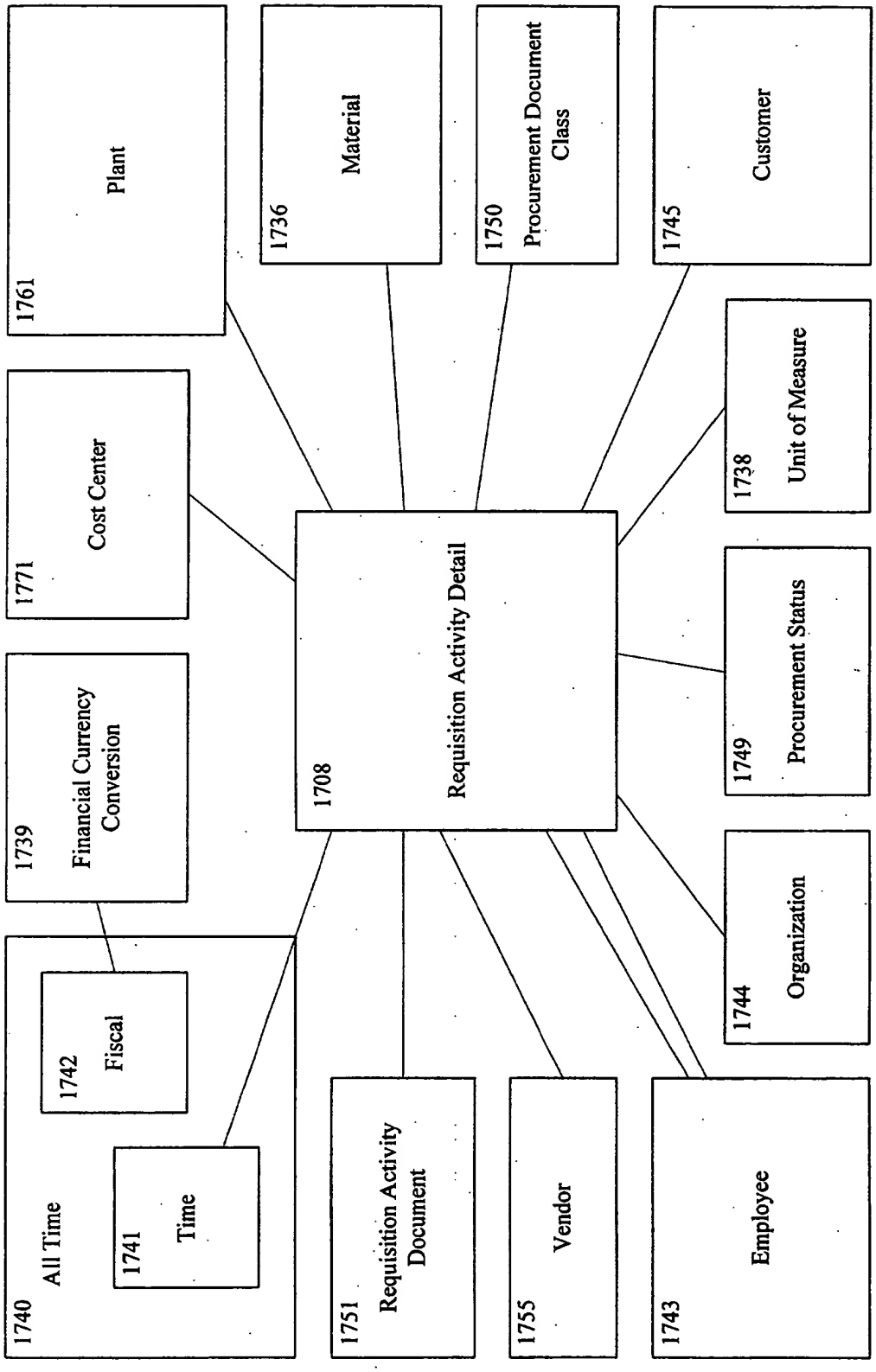

1761
Plant
1736
Material
1750
Procurement Document Class
1745
Customer
1771
Cost Center
1738
Unit of Measure
1739
Financial Currency Conversion
1707
Procurement Activity Periodic Summary
1749
Procurement Status
1740
All Time
1742
Fiscal
1741
Time
1744
Organization
1753
Purchase Order Activity Document
1755
Vendor
1743
Employee

Figure 18A


1708
Requisition Activity Detail
1761
Plant
1736
Material
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Procurement Document Class
1745
Customer
1771
Cost Center
1738
Unit of Measure
1739
Financial Currency Conversion
1749
Procurement Status
1740
All Time
1742
Fiscal
1741
Time
1744
Organization
1751
Requisition Activity Document
1755
Vendor
1743
Employee

Figure 18B

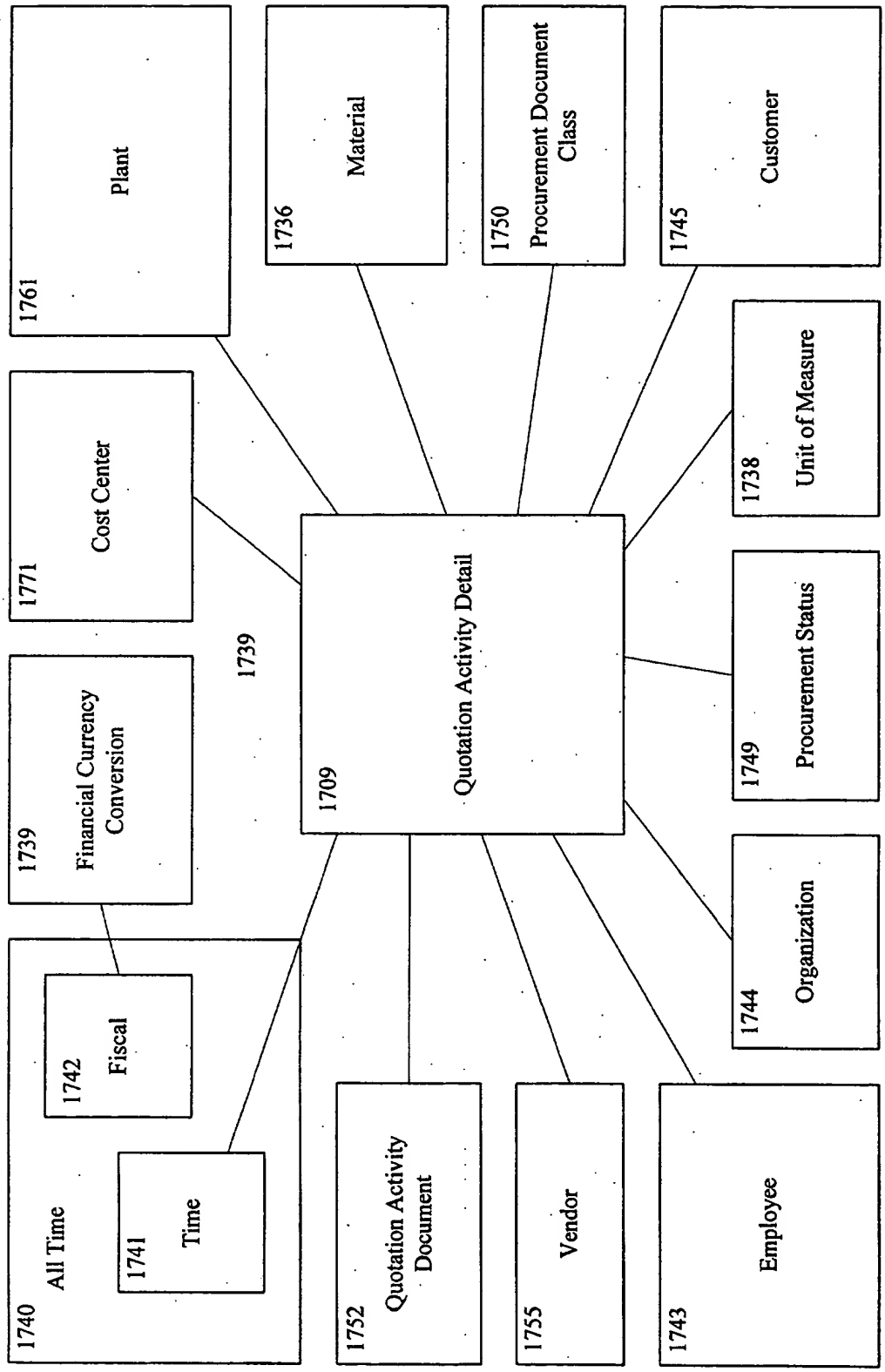

1709
Quotation Activity Detail
1739
1761
Plant
1736
Material
1750
Procurement Document Class
1745
Customer
1738
Unit of Measure
1749
Procurement Status
1744
Organization
1743
Employee
1755
Vendor
1752
Quotation Activity Document
1740
All Time
1741
Time
1742
Fiscal
1739
Financial Currency Conversion
1771
Cost Center

Figure 18C

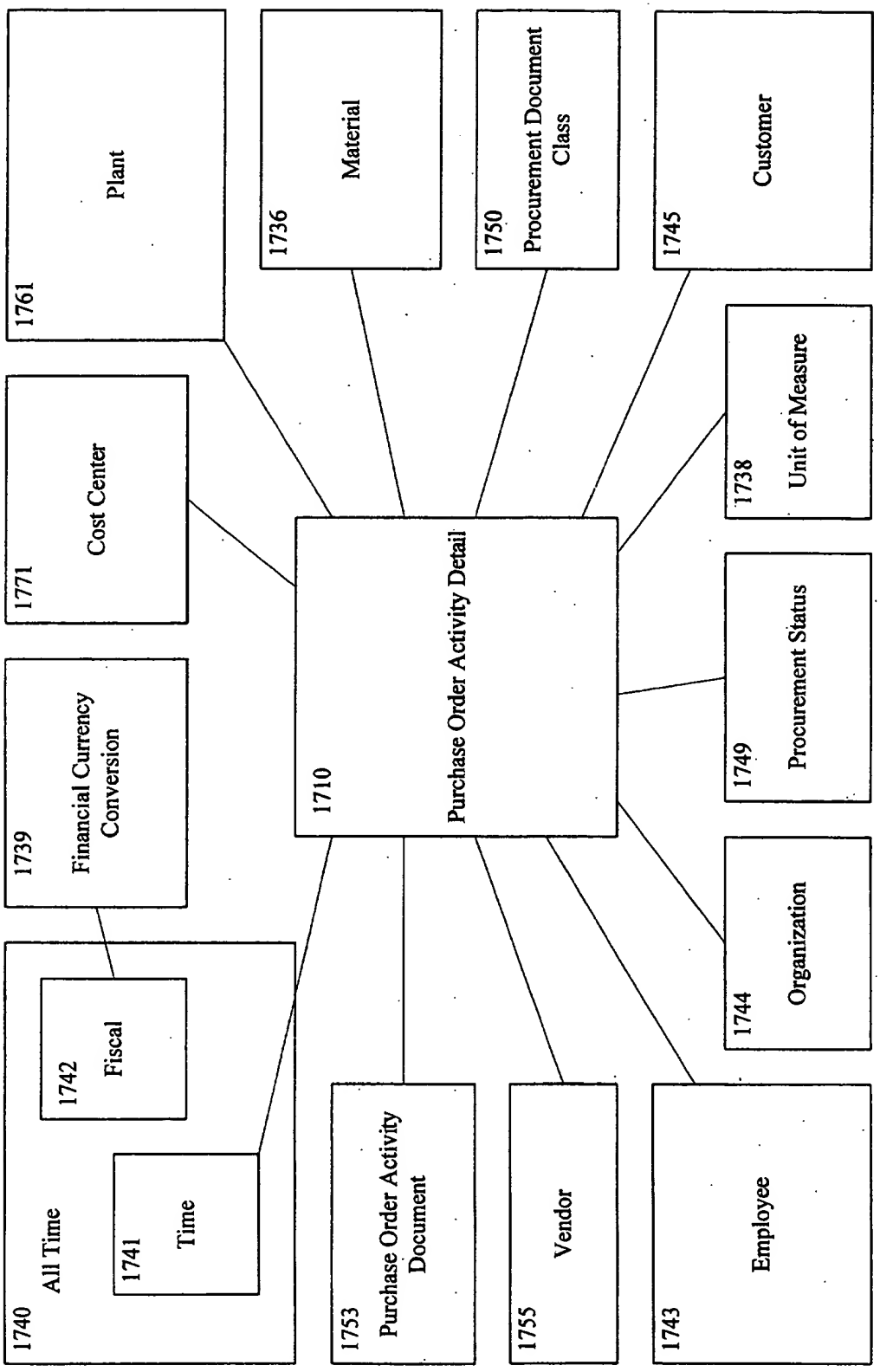

1761 Plant
1736 Material
1750 Procurement Document Class
1745 Customer
1771 Cost Center
1738 Unit of Measure
1739 Financial Currency Conversion
1710 Purchase Order Activity Detail
1749 Procurement Status
1740 All Time
1742 Fiscal
1741 Time
1744 Organization
1753 Purchase Order Activity Document
1755 Vendor
1743 Employee

Figure 18D

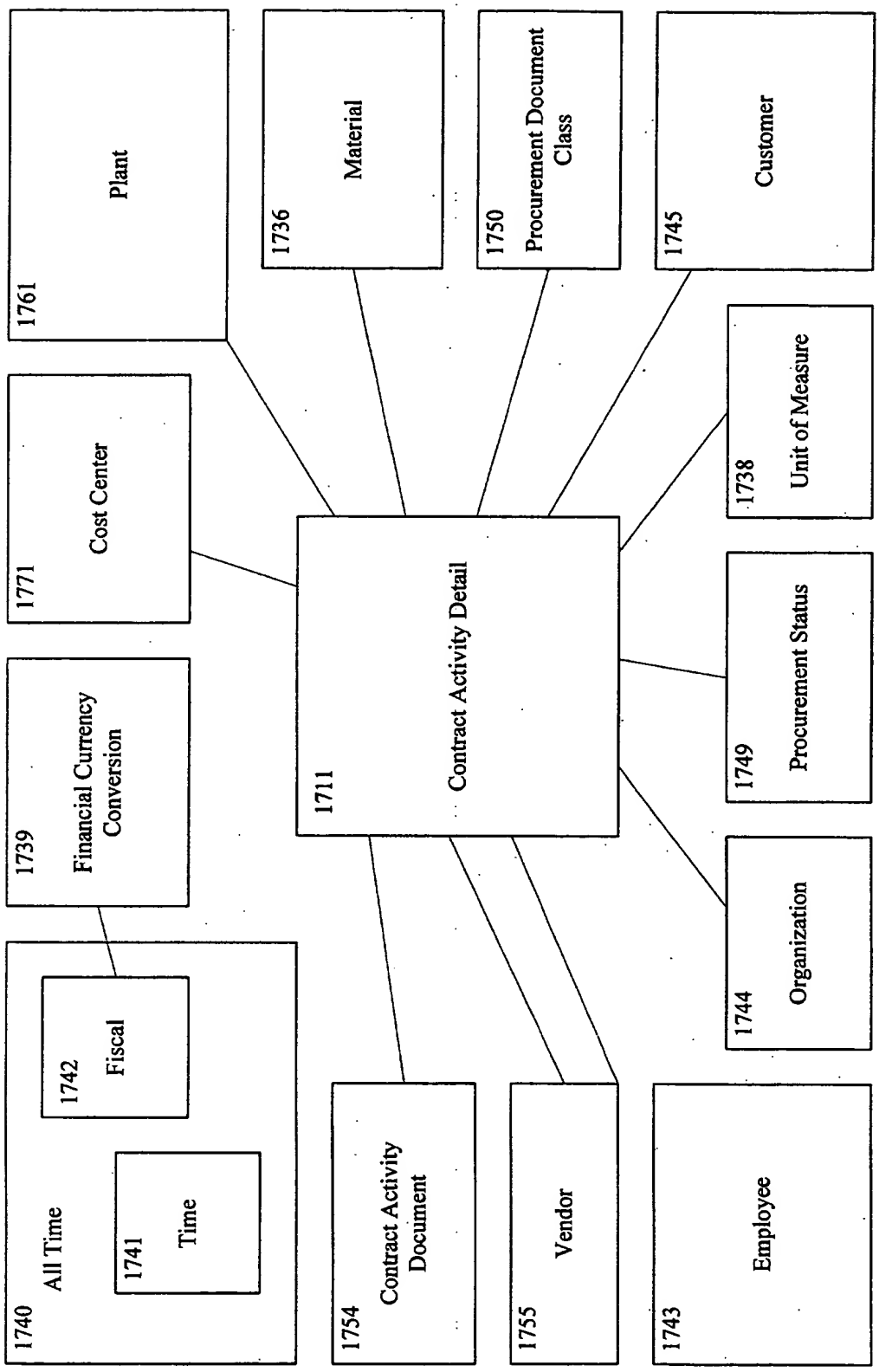
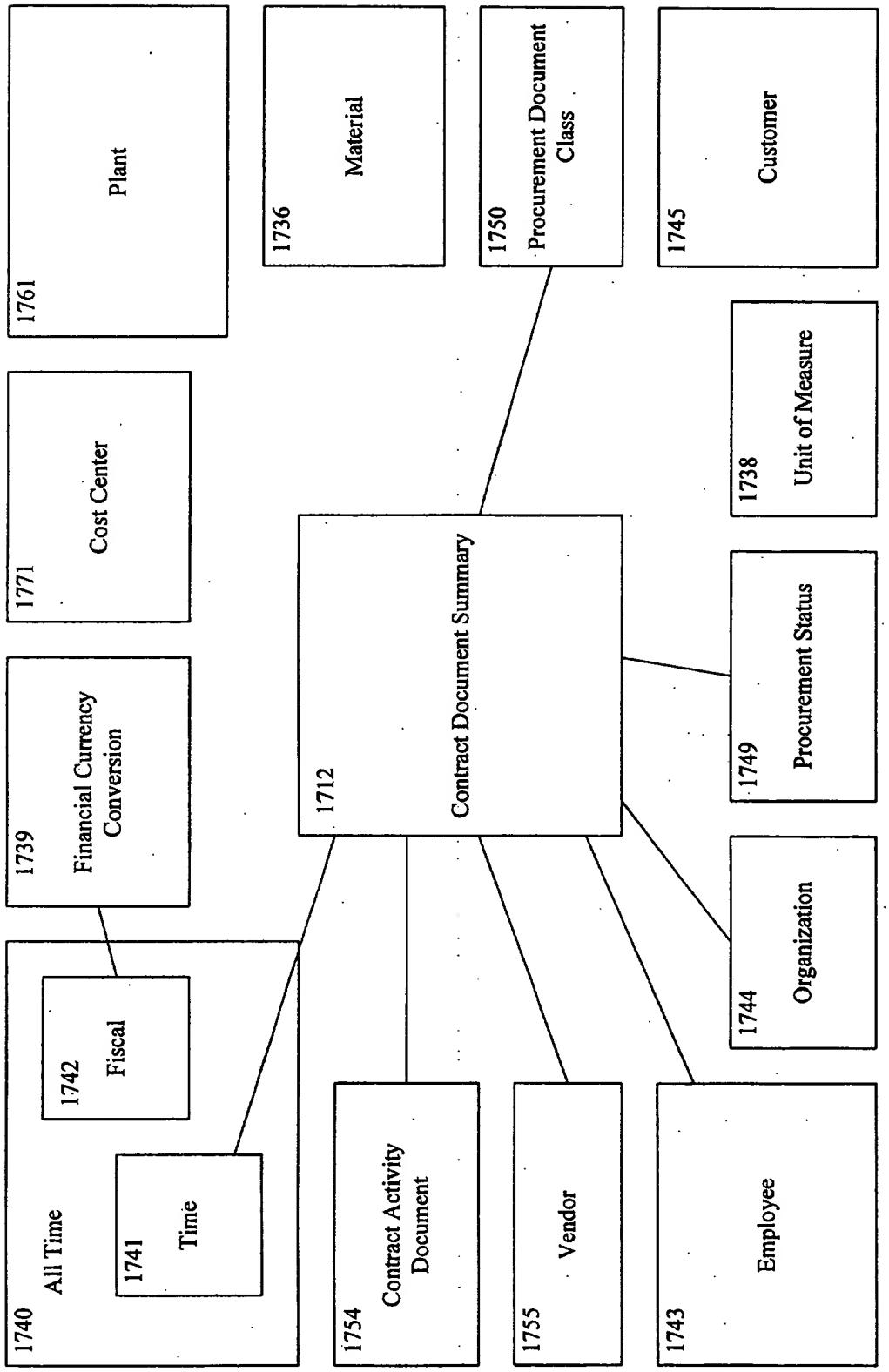

1761 Plant
1736 Material
1750 Procurement Document Class
1745 Customer
1771 Cost Center
1738 Unit of Measure
1739 Financial Currency Conversion
1711 Contract Activity Detail
1749 Procurement Status
1740 All Time
1742 Fiscal
1741 Time
1744 Organization
1754 Contract Activity Document
1755 Vendor
1743 Employee

Figure 18E


1761
Plant
1736
Material
1750
Procurement Document Class
1745
Customer
1771
Cost Center
1738
Unit of Measure
1739
Financial Currency Conversion
1712
Contract Document Summary
1749
Procurement Status
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All Time
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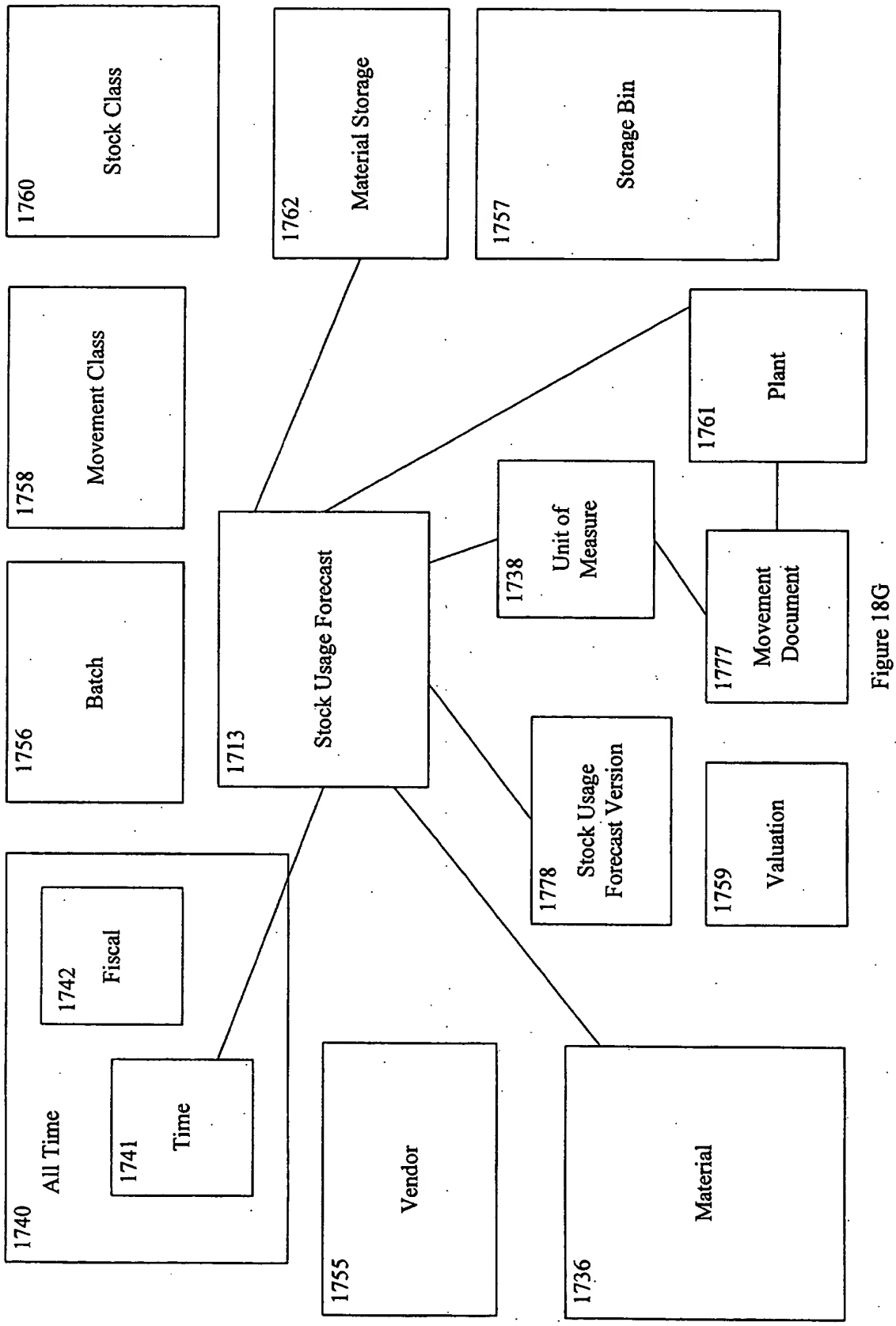
Fiscal
1741
Time
1744
Organization
1754
Contract Activity Document
1755
Vendor
1743
Employee

Figure 18F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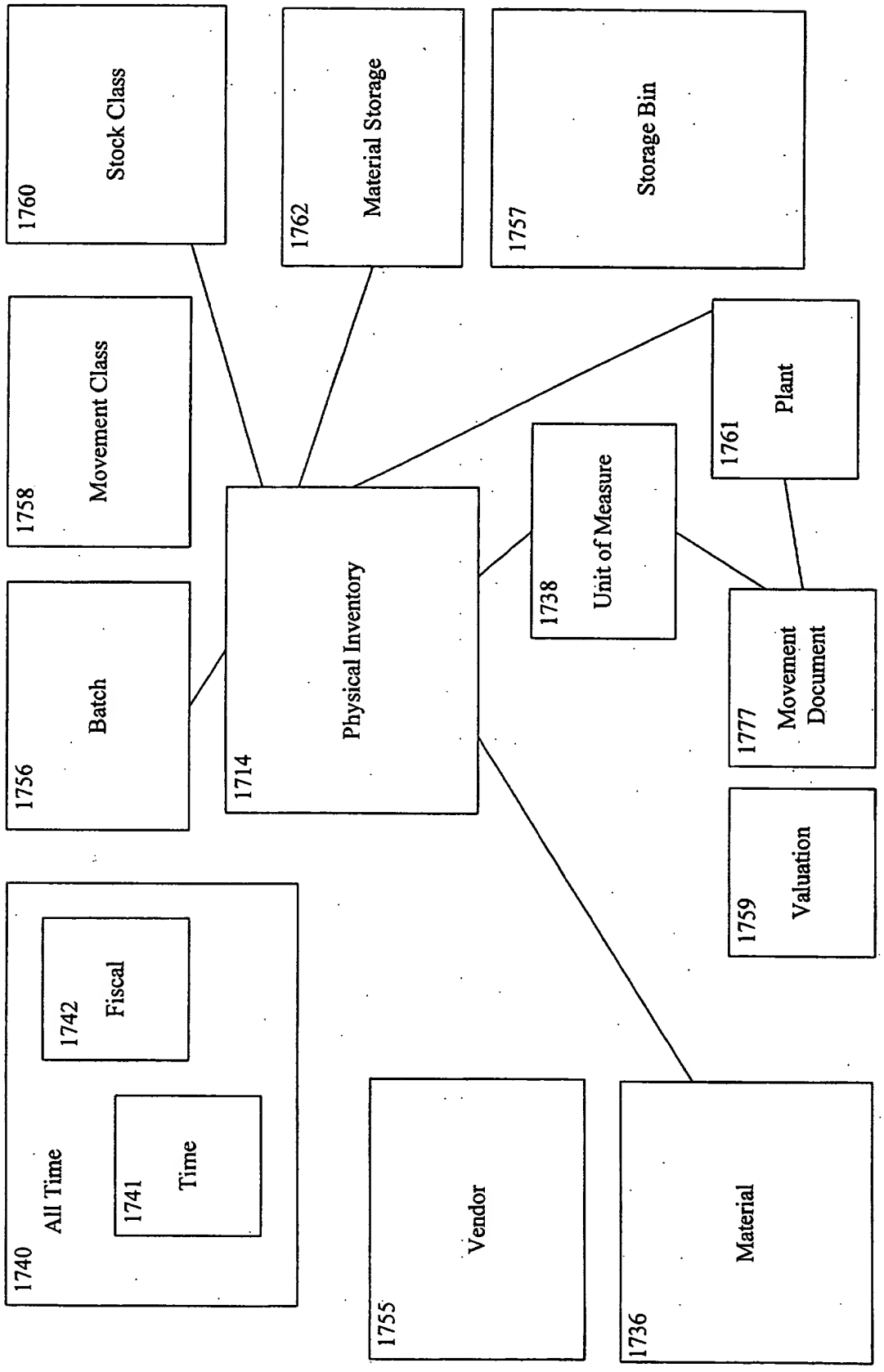
Stock Class
1762
Material Storage
1757
Storage Bin
1758
Movement Class
1761
Plant
1738
Unit of Measure
1756
Batch
1713
Stock Usage Forecast
1777
Movement Document
1778
Stock Usage Forecast Version
1759
Valuation
1740
All Time
1742
Fiscal
1741
Time
1755
Vendor
1736
Material

Figure 18G


1760
Stock Class
1762
Material Storage
1757
Storage Bin
1758
Movement Class
1761
Plant
1738
Unit of Measure
1756
Batch
1714
Physical Inventory
1777
Movement Document
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Valuation
1740
All Time
1742
Fiscal
1741
Time
1755
Vendor
1736
Material

Figure 18H

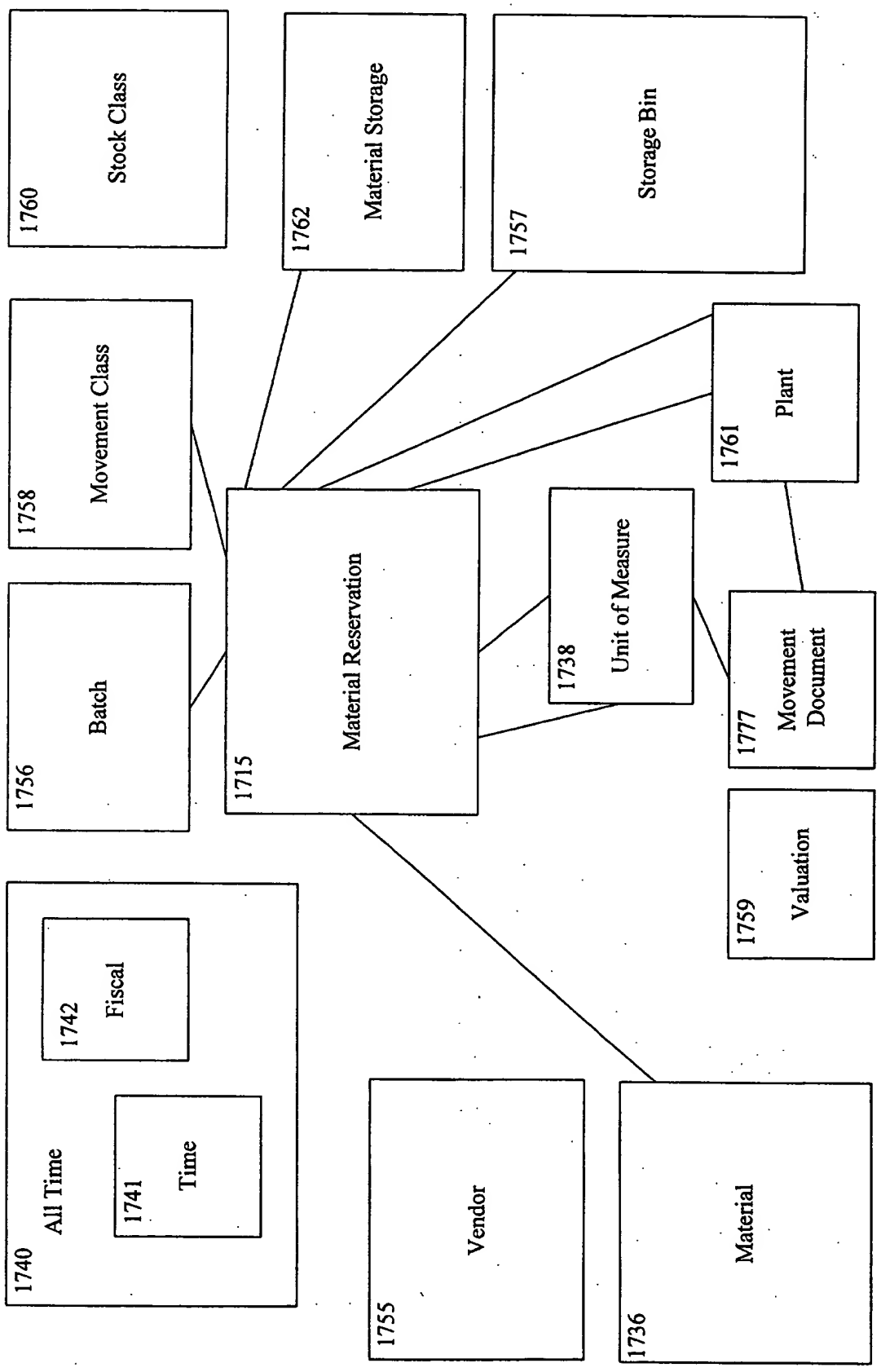

1760
Stock Class
1762
Material Storage
1757
Storage Bin
1758
Movement Class
1761
Plant
1756
Batch
1715
Material Reservation
1738
Unit of Measure
1777
Movement Document
1759
Valuation
1740
All Time
1742
Fiscal
1741
Time
1755
Vendor
1736
Material

Figure 18I

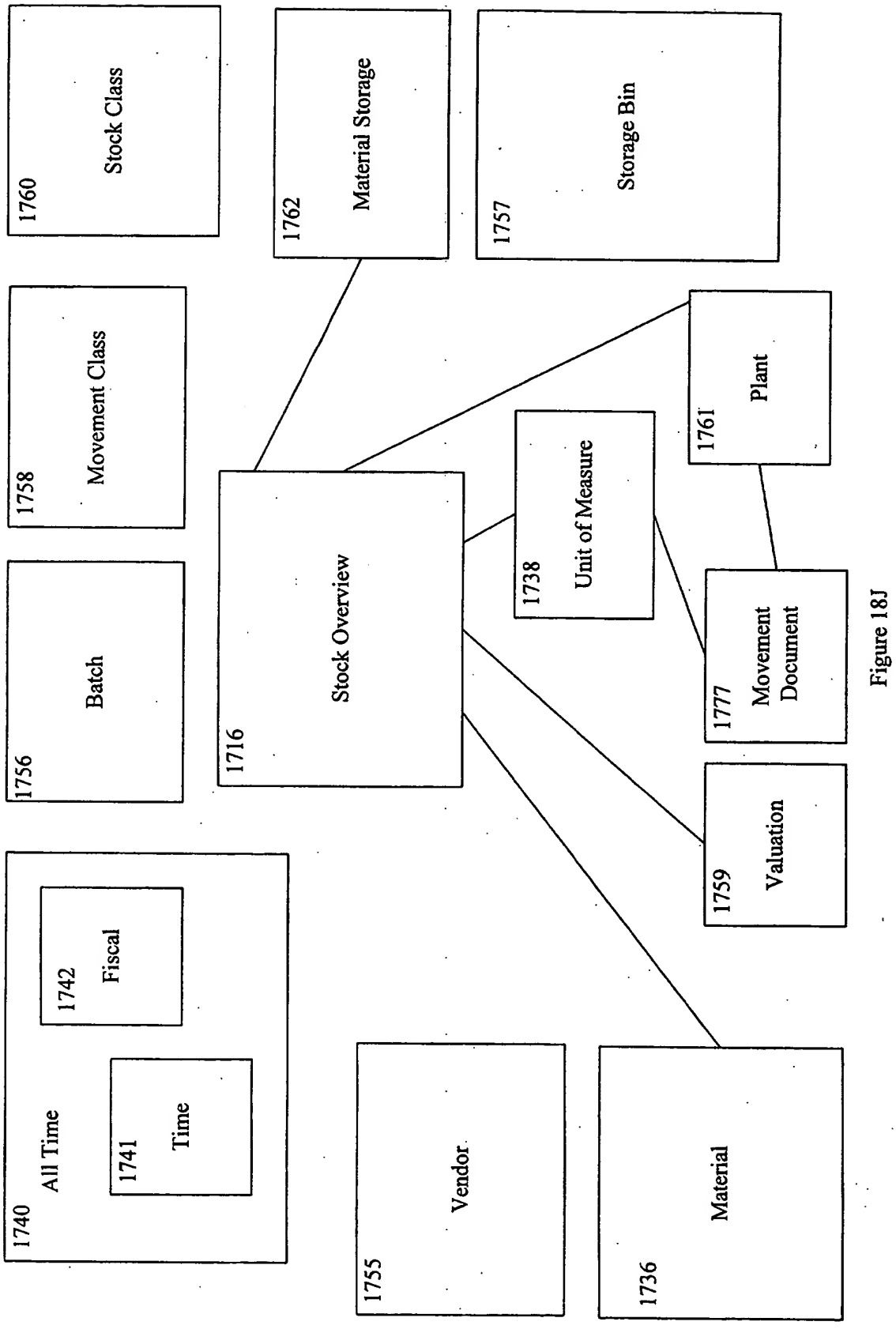
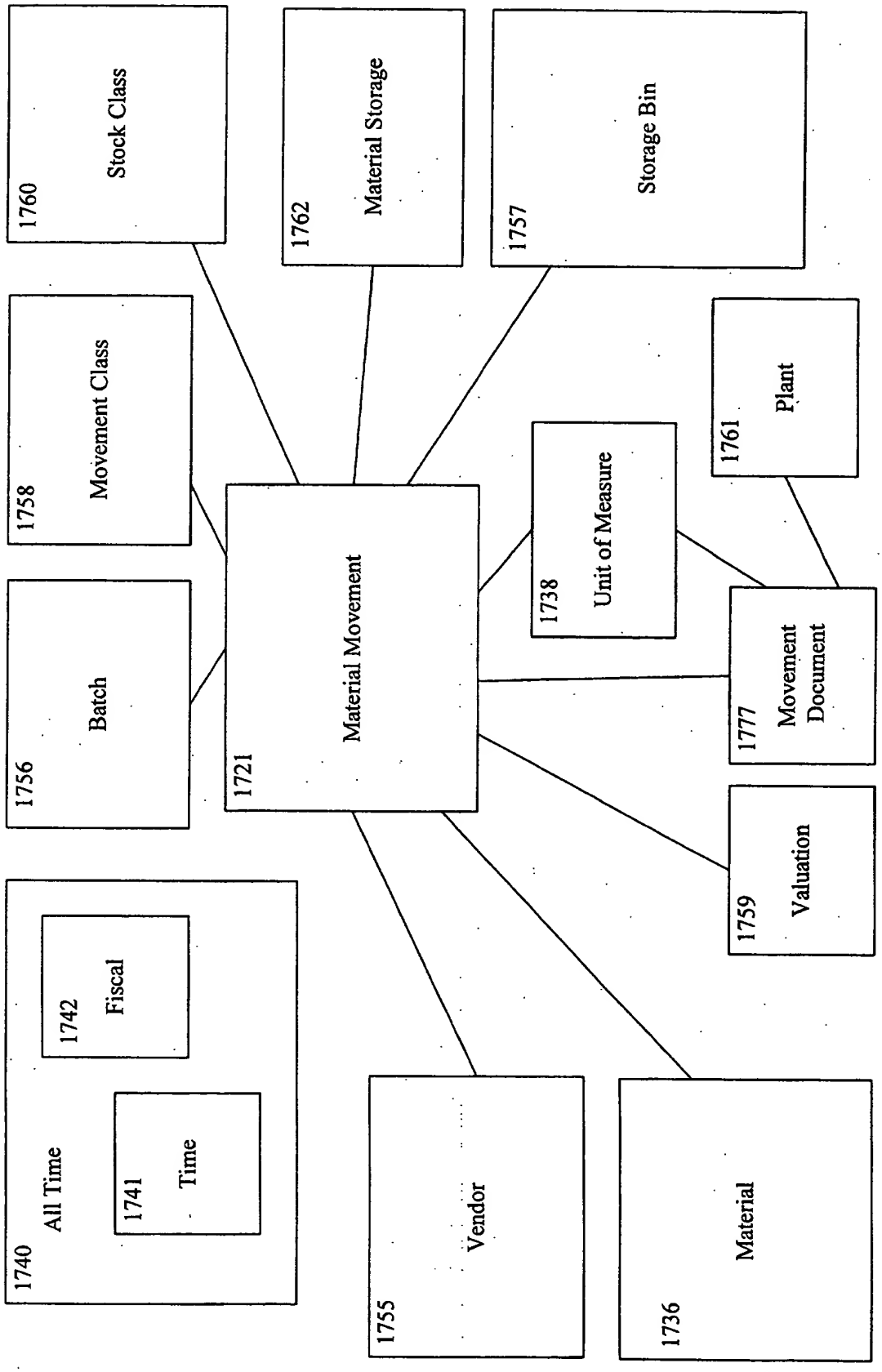

1760
Stock Class
1762
Material Storage
1757
Storage Bin
1758
Movement Class
1761
Plant
1738
Unit of Measure
1716
Stock Overview
1777
Movement Document
1759
Valuation
1756
Batch
1740
All Time
1742
Fiscal
1741
Time
1755
Vendor
1736
Material

Figure 18J


1760
Stock Class
1762
Material Storage
1757
Storage Bin
1758
Movement Class
1761
Plant
1738
Unit of Measure
1756
Batch
1721
Material Movement
1777
Movement Document
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Valuation
1742
Fiscal
1740
All Time
1741
Time
1755
Vendor
1736
Material

Figure 18K

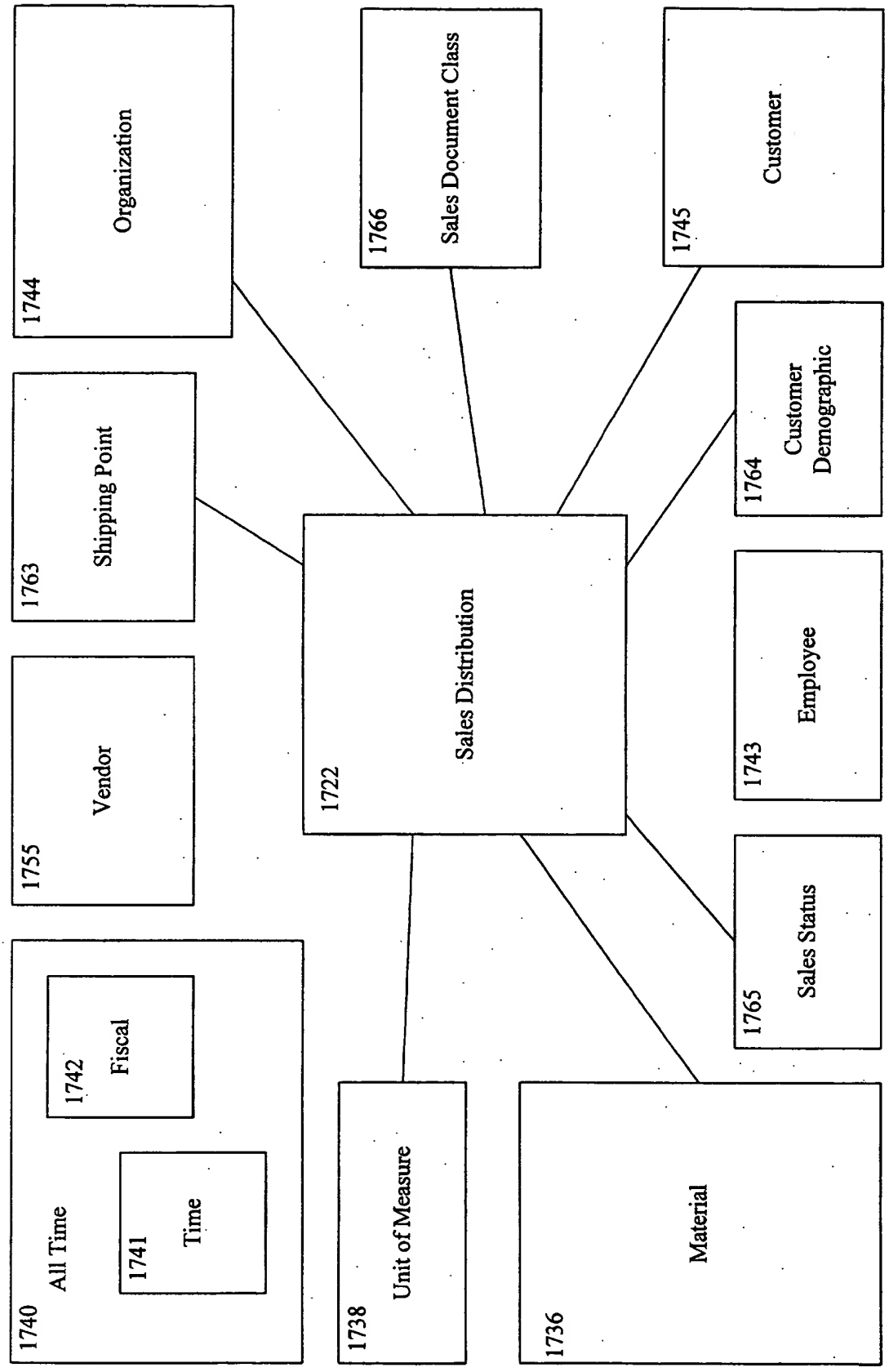

1744
Organization
1766
Sales Document Class
1745
Customer
1763
Shipping Point
1764
Customer Demographic
1755
Vendor
1722
Sales Distribution
1743
Employee
1740
All Time
1742
Fiscal
1741
Time
1765
Sales Status
1738
Unit of Measure
1736
Material

Figure 18L

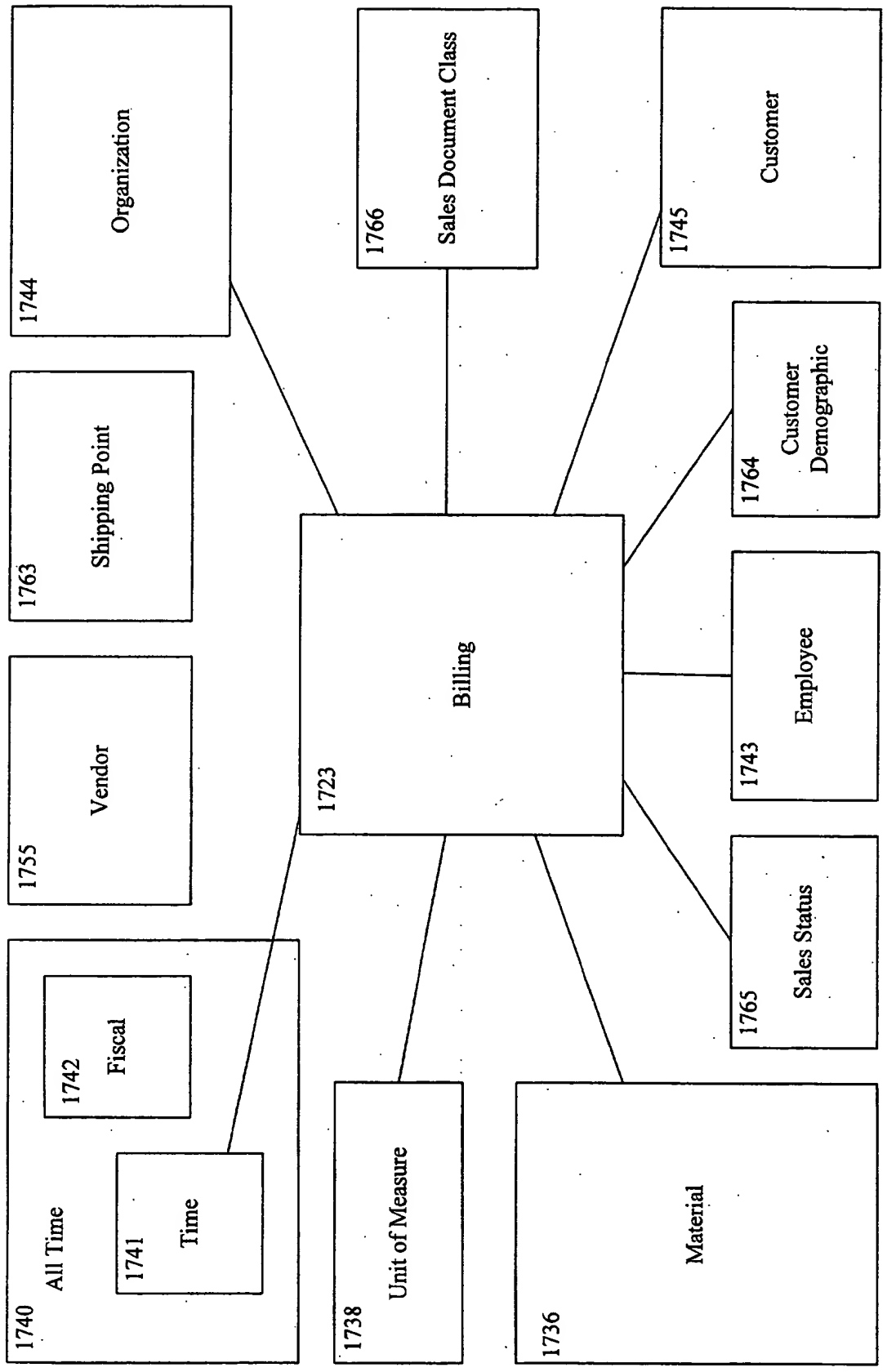

1744
Organization
1766
Sales Document Class
1745
Customer
1763
Shipping Point
1764
Customer Demographic
1723
Billing
1755
Vendor
1743
Employee
1740
All Time
1742
Fiscal
1741
Time
1765
Sales Status
1738
Unit of Measure
1736
Material

Figure 18M

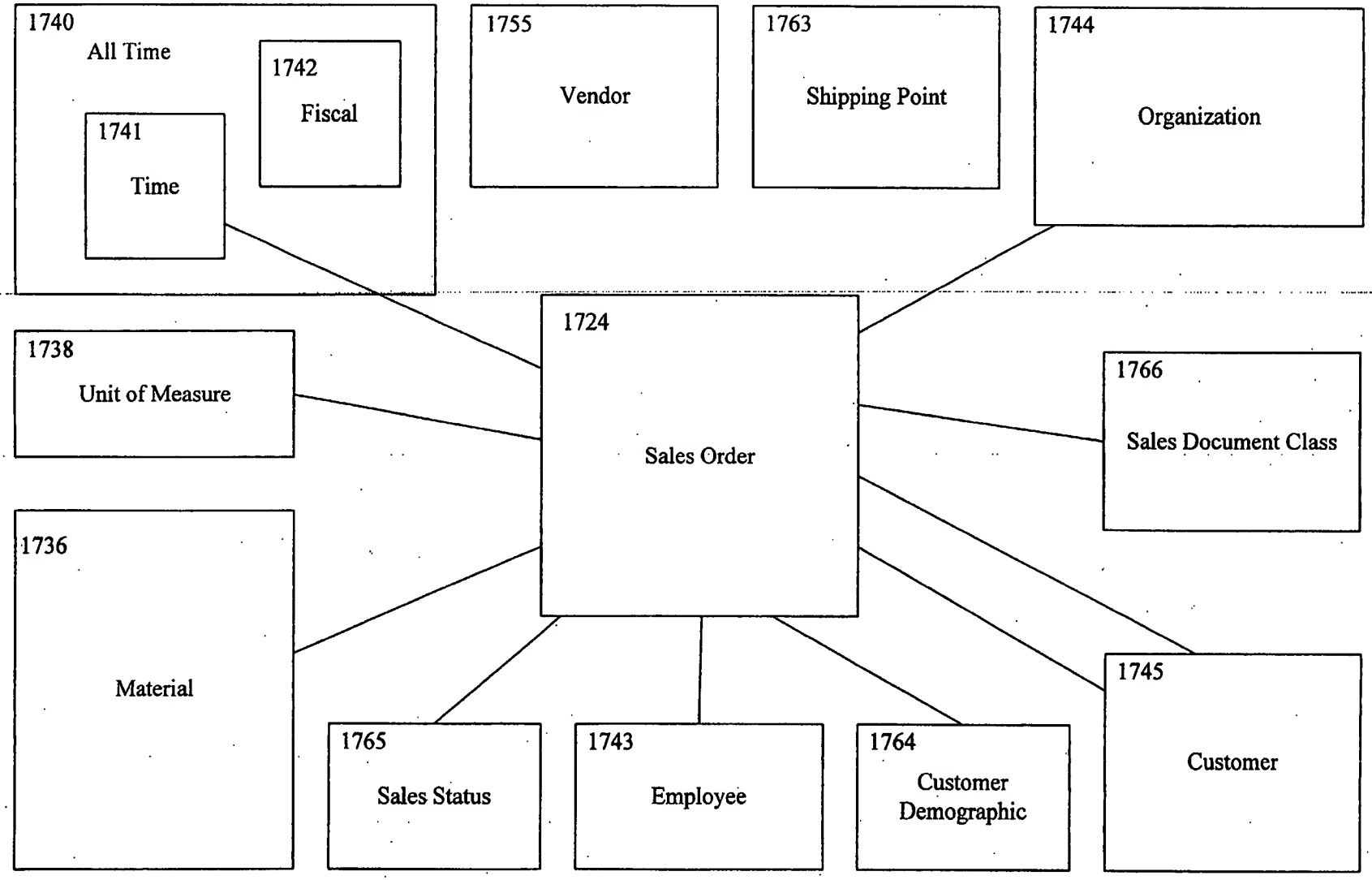


Figure 18N

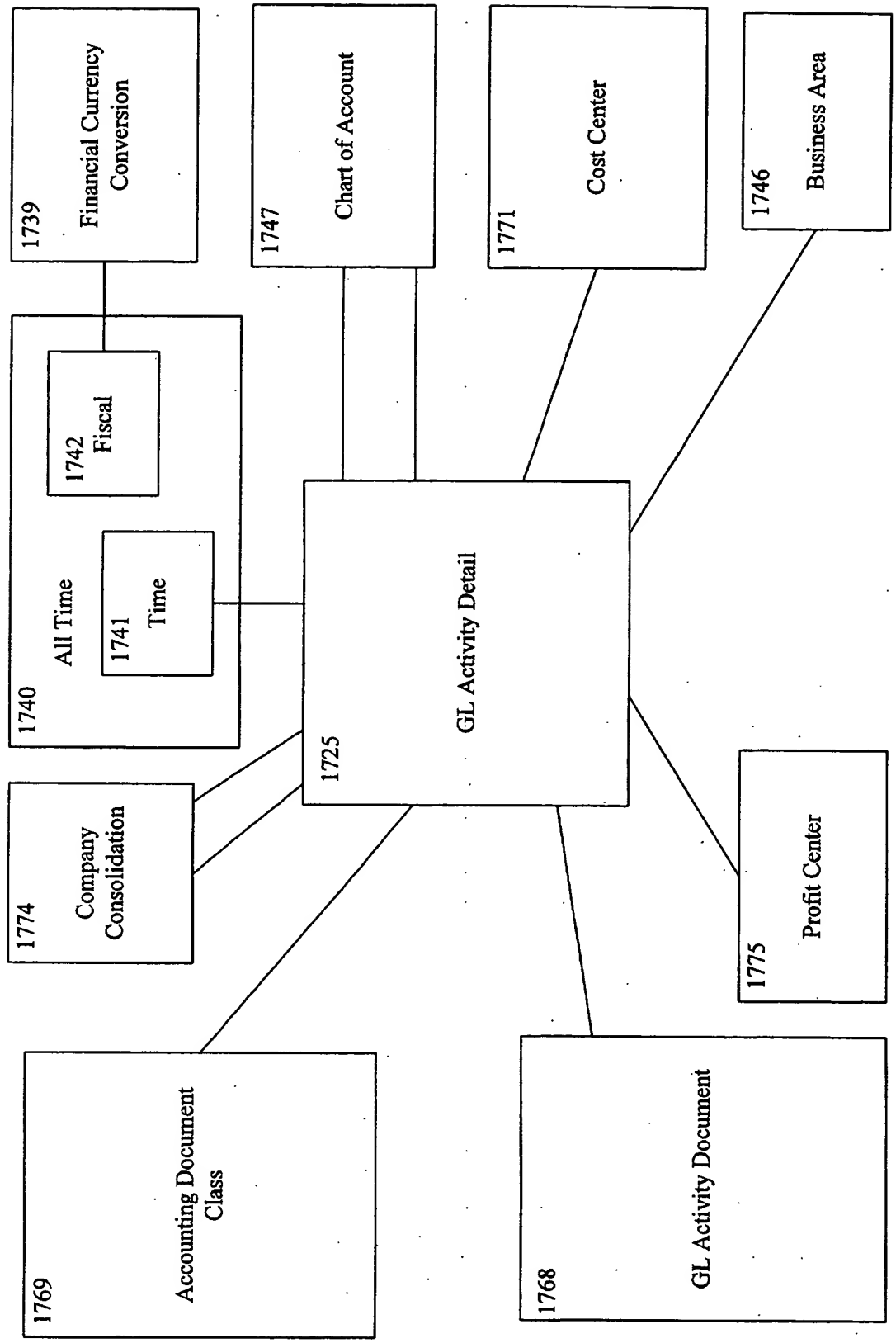

1739
Financial Currency Conversion
1747
Chart of Account
1771
Cost Center
1746
Business Area
1742
Fiscal
1740
All Time
1741
Time
1725
GL Activity Detail
1774
Company Consolidation
1775
Profit Center
1769
Accounting Document Class
1768
GL Activity Document

Figure 18O

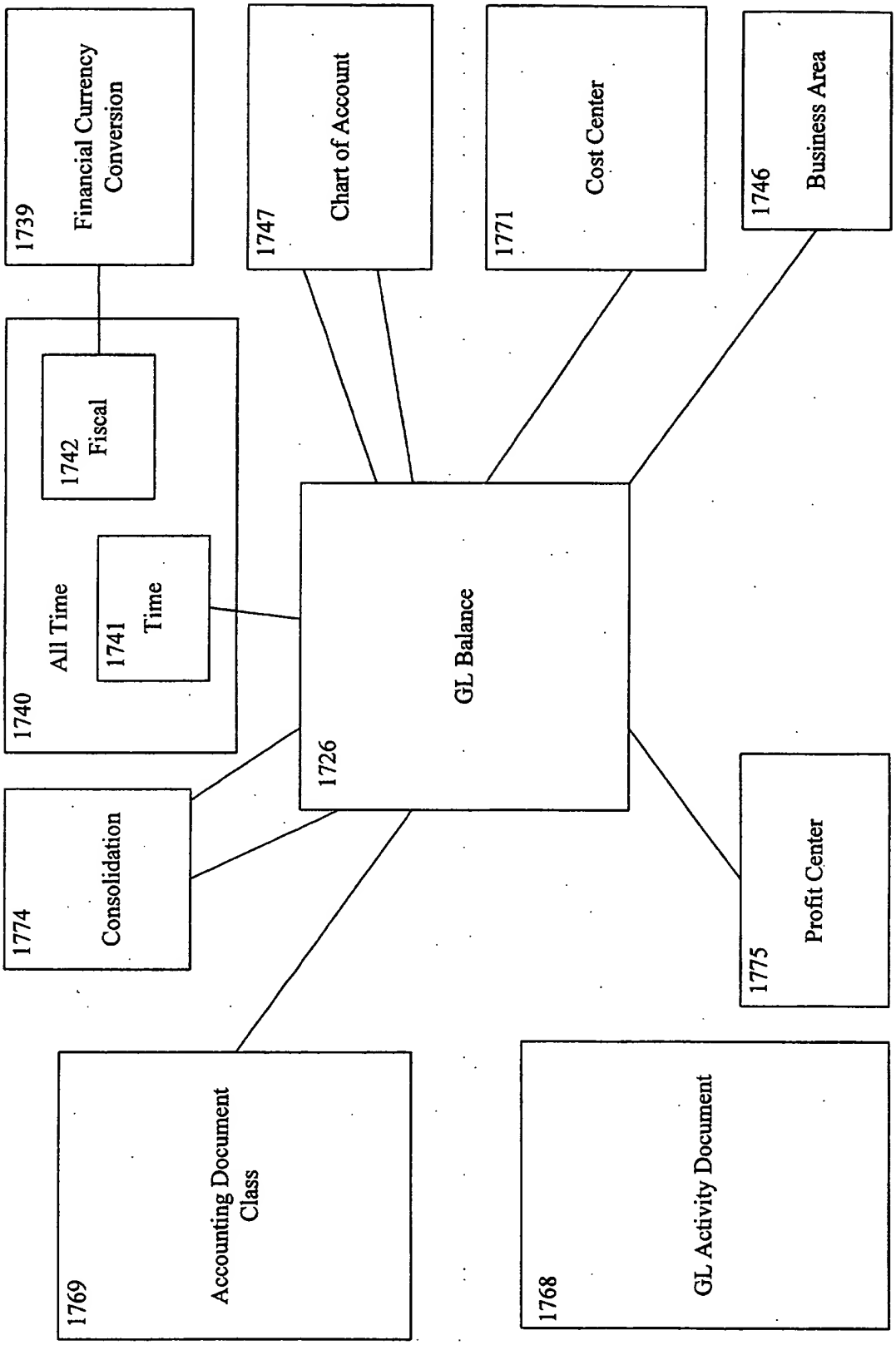

1739
Financial Currency Conversion
1747
Chart of Account
1771
Cost Center
1746
Business Area
1740
All Time
1742
Fiscal
1741
Time
1726
GL Balance
1774
Consolidation
1775
Profit Center
1769
Accounting Document Class
1768
GL Activity Document

Figure 18P

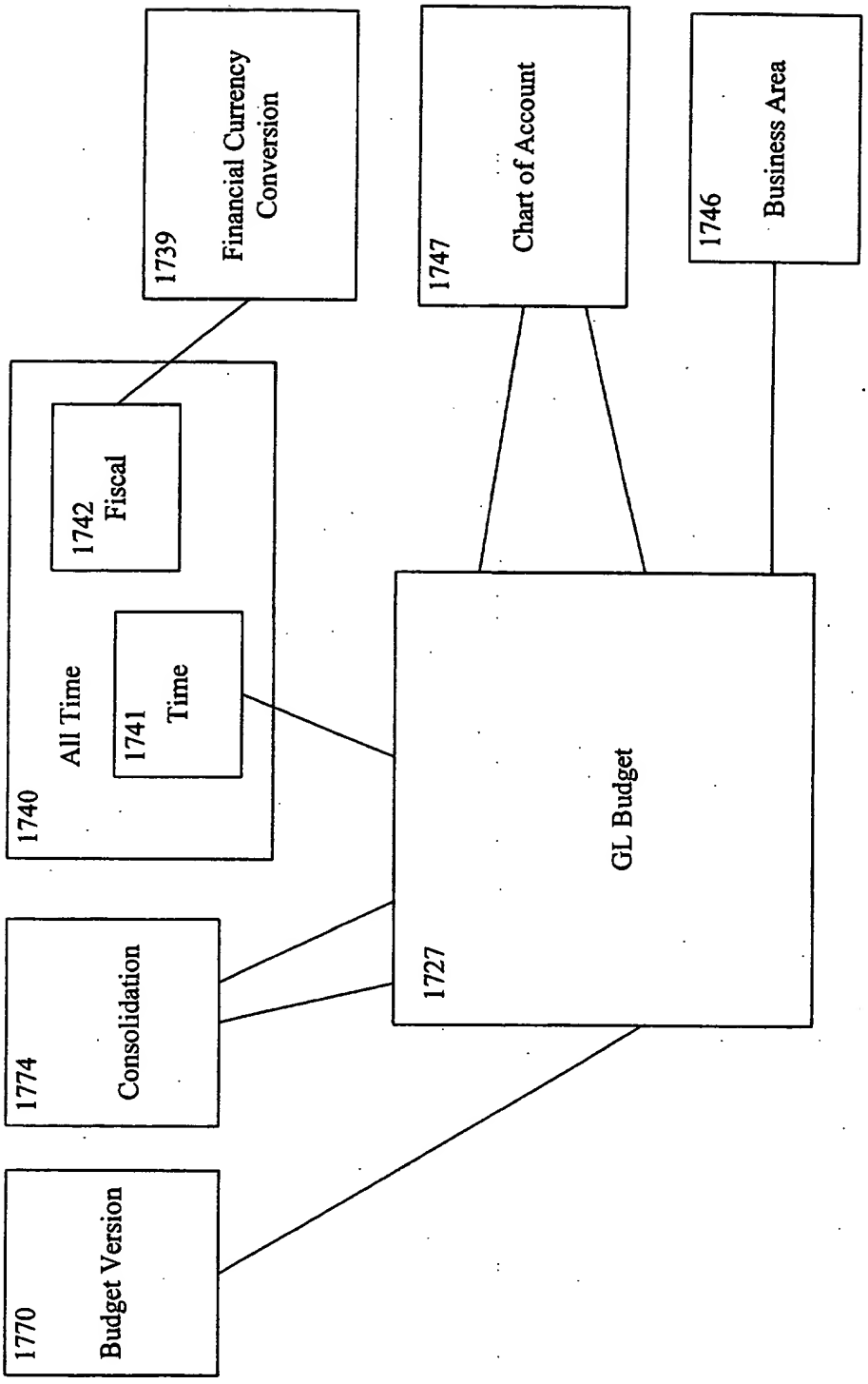

1739
Financial Currency Conversion
1747
Chart of Account
1746
Business Area
1742
Fiscal
1741
Time
All Time
1740
GL Budget
1727
1774
Consolidation
1770
Budget Version

Figure 18Q

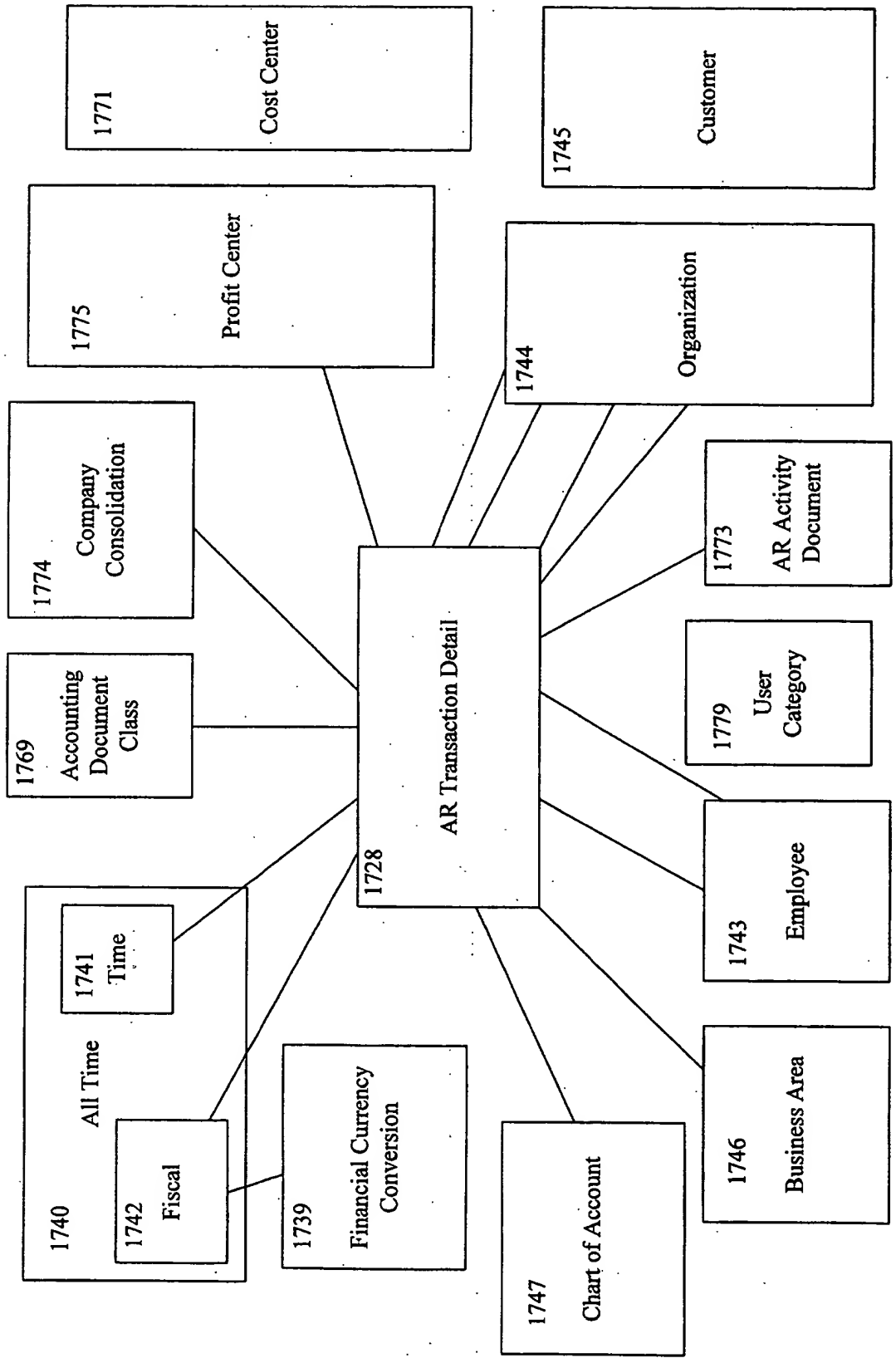

1771
Cost Center
1745
Customer
1775
Profit Center
1744
Organization
1774
Company Consolidation
1773
AR Activity Document
1769
Accounting Document Class
1728
AR Transaction Detail
1779
User Category
1740
All Time
1741
Time
1742
Fiscal
1739
Financial Currency Conversion
1743
Employee
1747
Chart of Account
1746
Business Area

Figure 18R

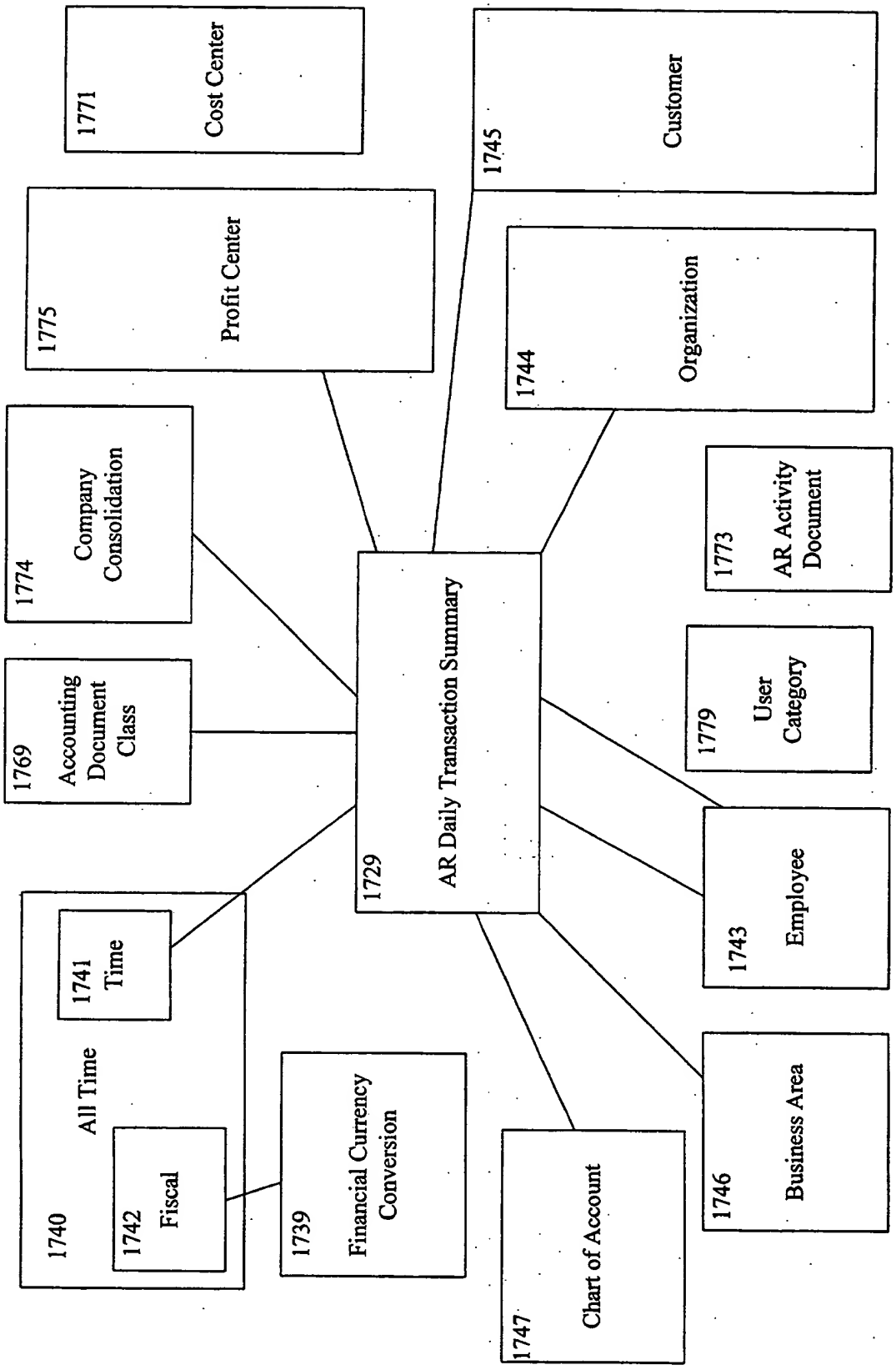

1771 Cost Center
1745 Customer
1775 Profit Center
1744 Organization
1774 Company Consolidation
1773 AR Activity Document
1769 Accounting Document Class
1729 AR Daily Transaction Summary
1779 User Category
1740 All Time
1741 Time
1743 Employee
1742 Fiscal
1739 Financial Currency Conversion
1746 Business Area
1747 Chart of Account

Figure 18S

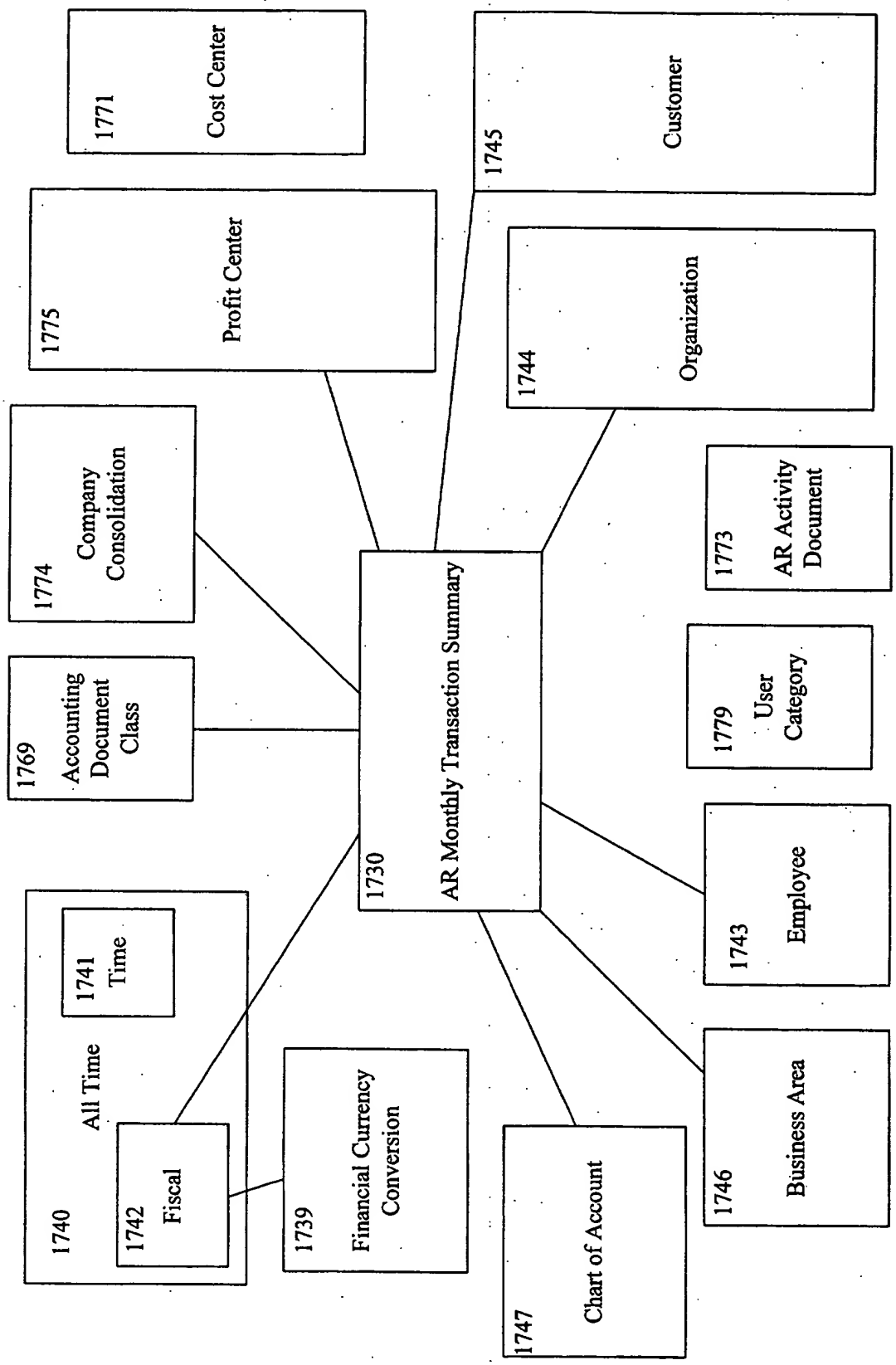

1771 Cost Center
1745 Customer
1775 Profit Center
1744 Organization
1774 Company Consolidation
1773 AR Activity Document
1769 Accounting Document Class
1730 AR Monthly Transaction Summary
1779 User Category
1740 All Time
1741 Time
1743 Employee
1742 Fiscal
1739 Financial Currency Conversion
1746 Business Area
1747 Chart of Account

Figure 18T

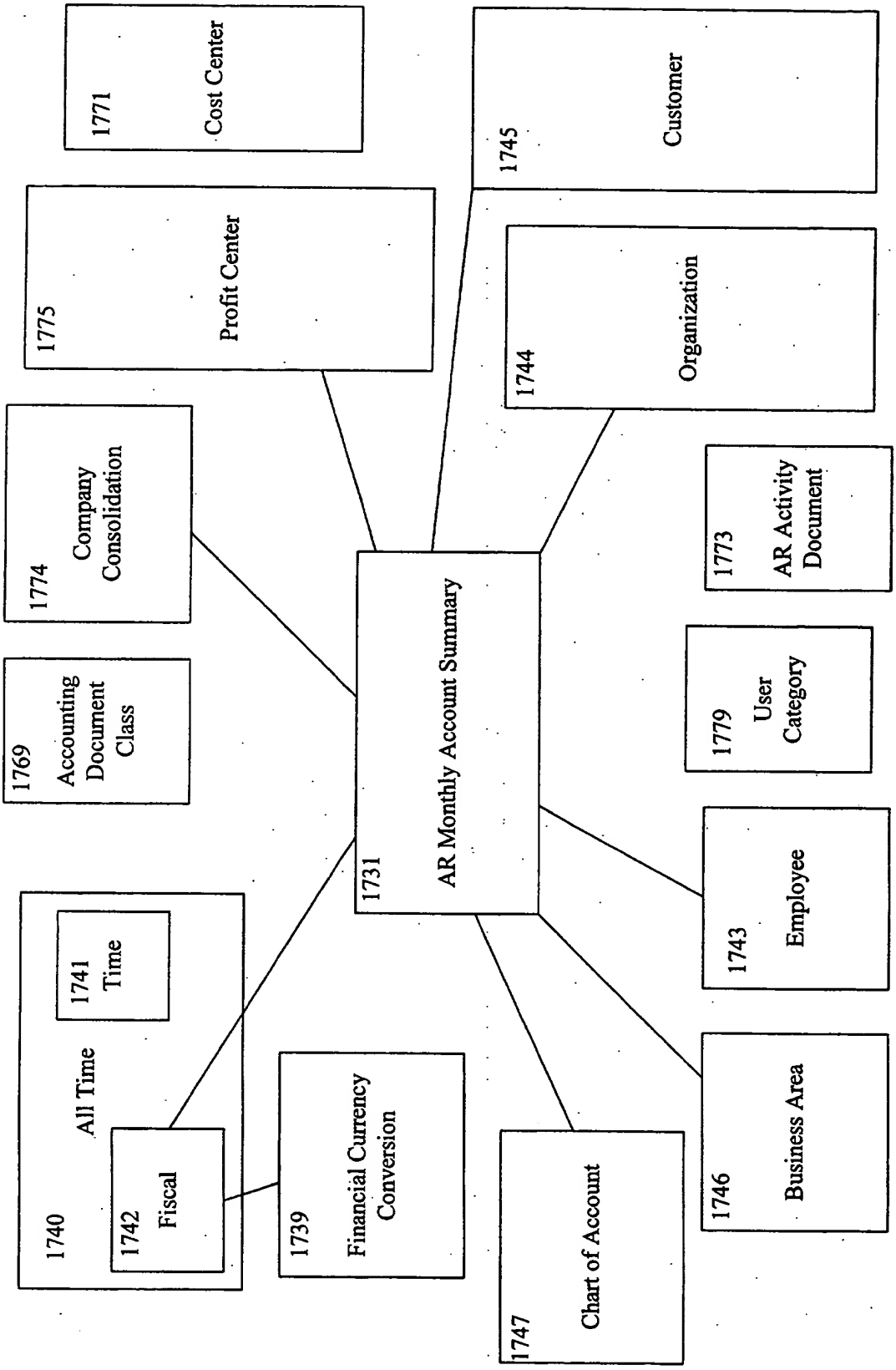

1771 Cost Center
1745 Customer
1775 Profit Center
1744 Organization
1774 Company Consolidation
1773 AR Activity Document
1769 Accounting Document Class
1731 AR Monthly Account Summary
1779 User Category
1740 All Time
1741 Time
1743 Employee
1742 Fiscal
1739 Financial Currency Conversion
1746 Business Area
1747 Chart of Account

Figure 18U

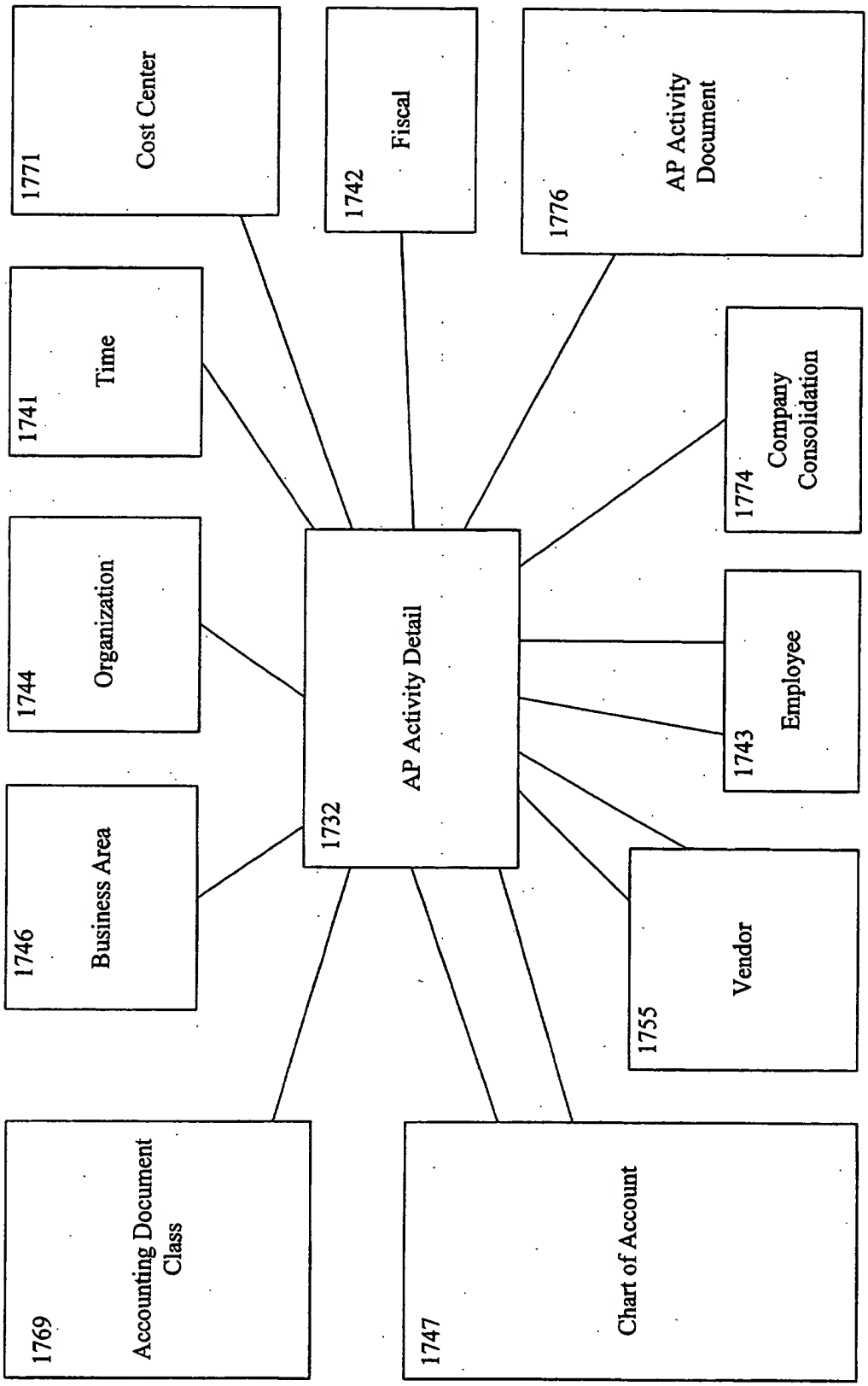

1771
Cost Center
1742
Fiscal
1776
AP Activity Document
1741
Time
1774
Company Consolidation
1744
Organization
1732
AP Activity Detail
1743
Employee
1746
Business Area
1755
Vendor
1769
Accounting Document Class
1747
Chart of Account

Figure 18V

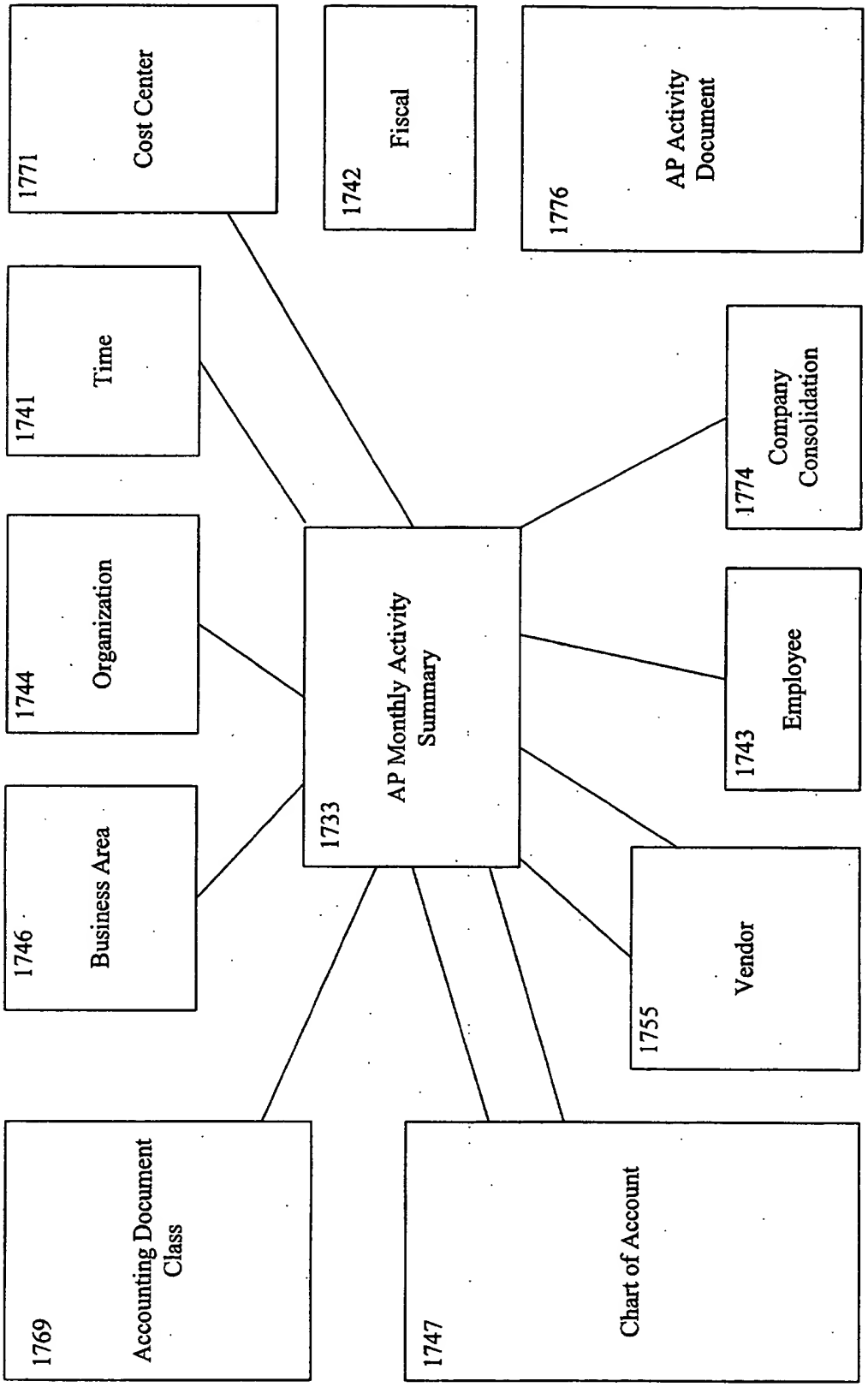
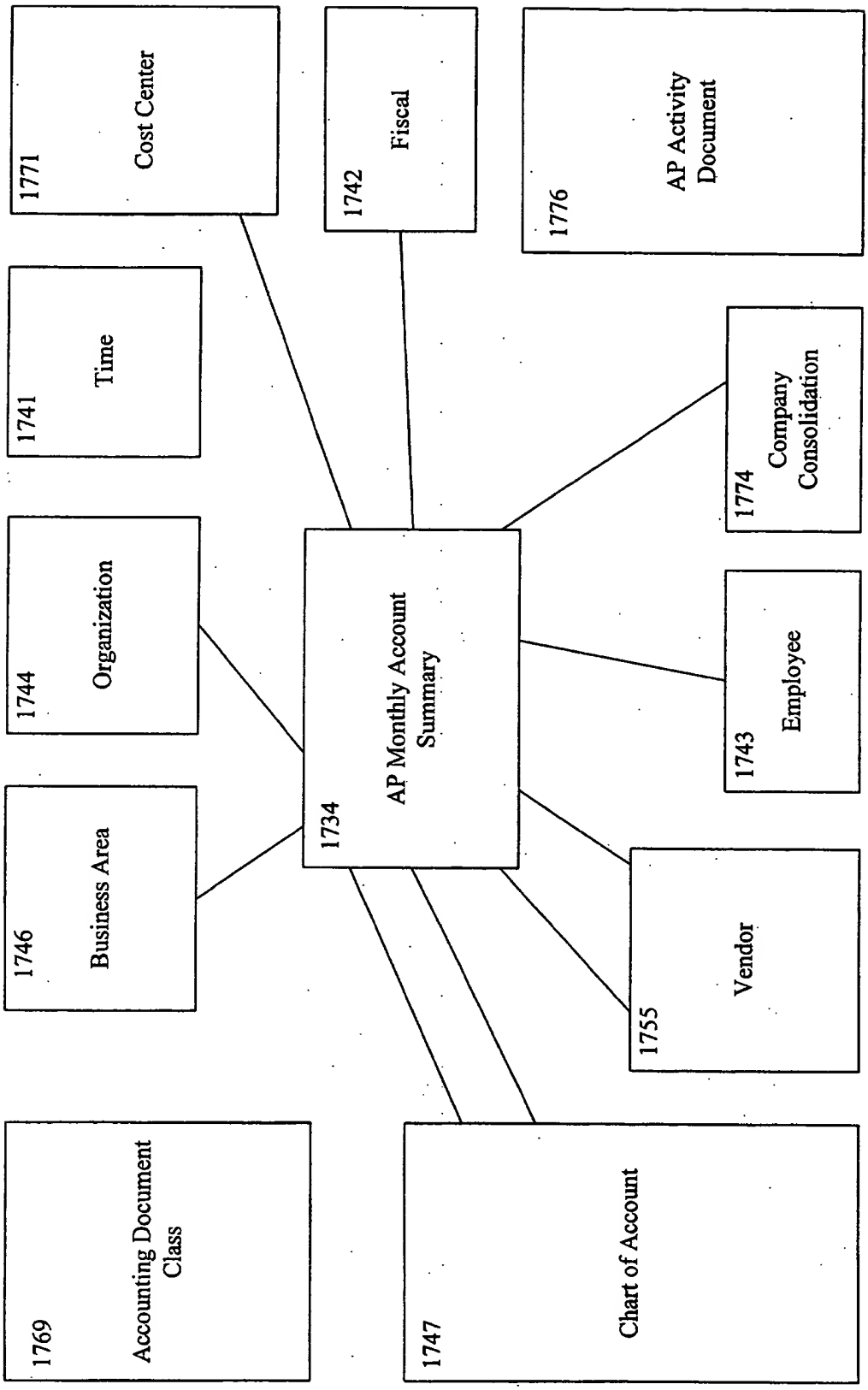

1771
Cost Center
1742
Fiscal
1776
AP Activity Document
1741
Time
1774
Company Consolidation
1744
Organization
1733
AP Monthly Activity Summary
1743
Employee
1746
Business Area
1755
Vendor
1769
Accounting Document Class
1747
Chart of Account

Figure 18W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Cost Center
1742
Fiscal
1776
AP Activity Document
1741
Time
1774
Company Consolidation
1744
Organization
1734
AP Monthly Account Summary
1743
Employee
1746
Business Area
1755
Vendor
1769
Accounting Document Class
1747
Chart of Account

Figure 18X

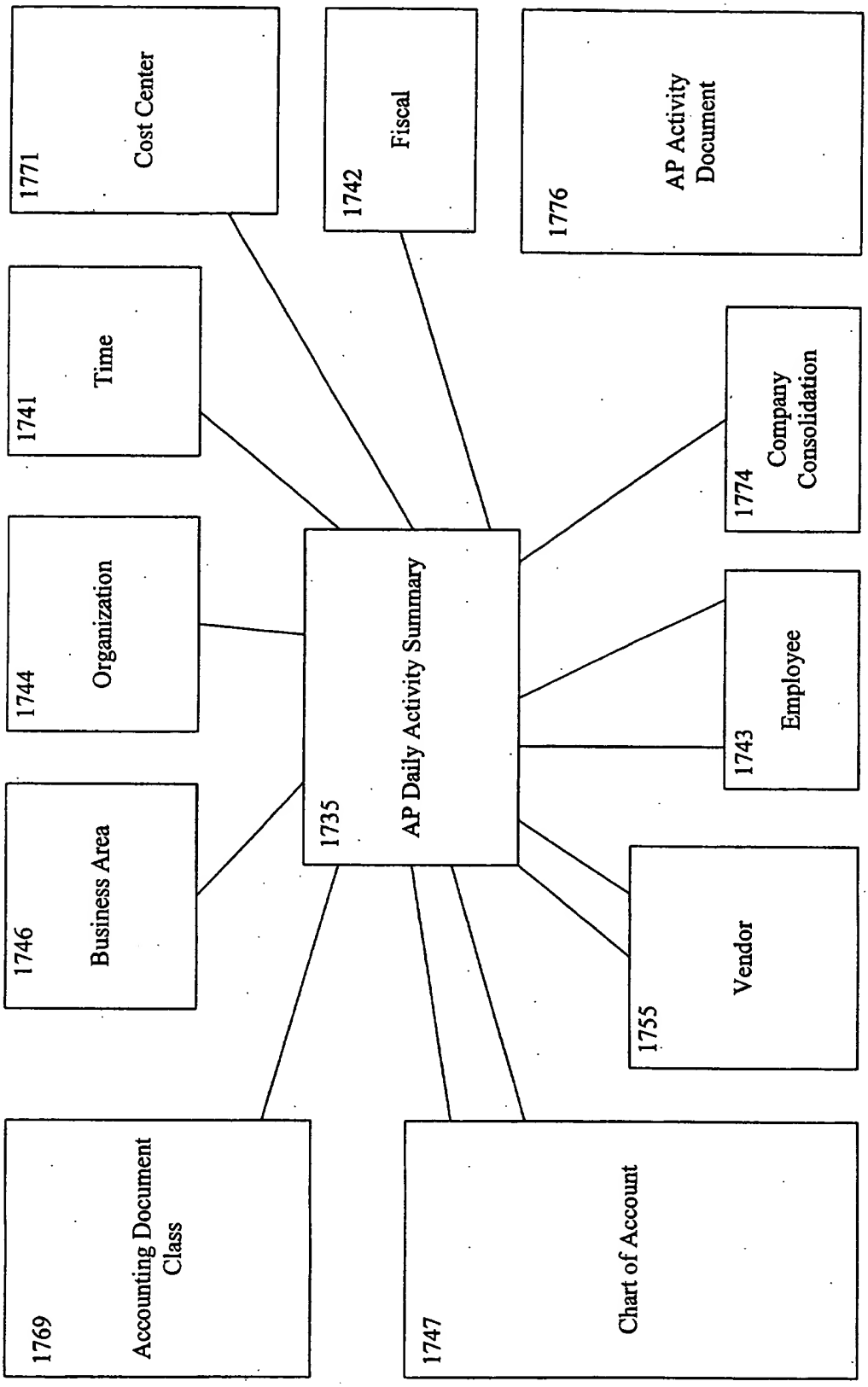

1771
Cost Center
1742
Fiscal
1776
AP Activity Document
1741
Time
1774
Company Consolidation
1744
Organization
1735
AP Daily Activity Summary
1743
Employee
1746
Business Area
1755
Vendor
1769
Accounting Document Class
1747
Chart of Account

Figure 18Y

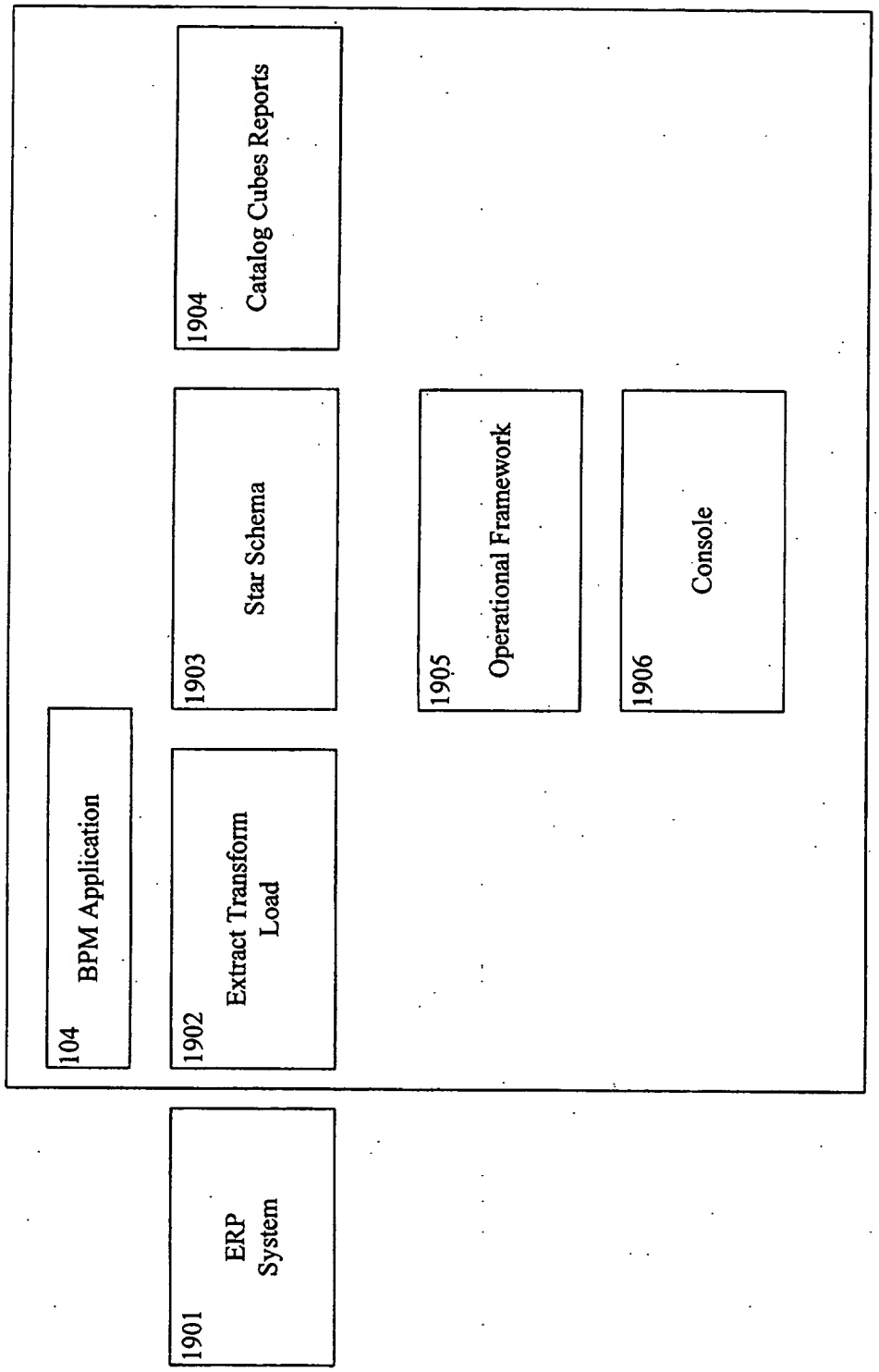

1901
ERP System
104
BPM Application
1902
Extract Transform Load
1903
Star Schema
1904
Catalog Cubes Reports
1905
Operational Framework
1906
Console

Figure 19

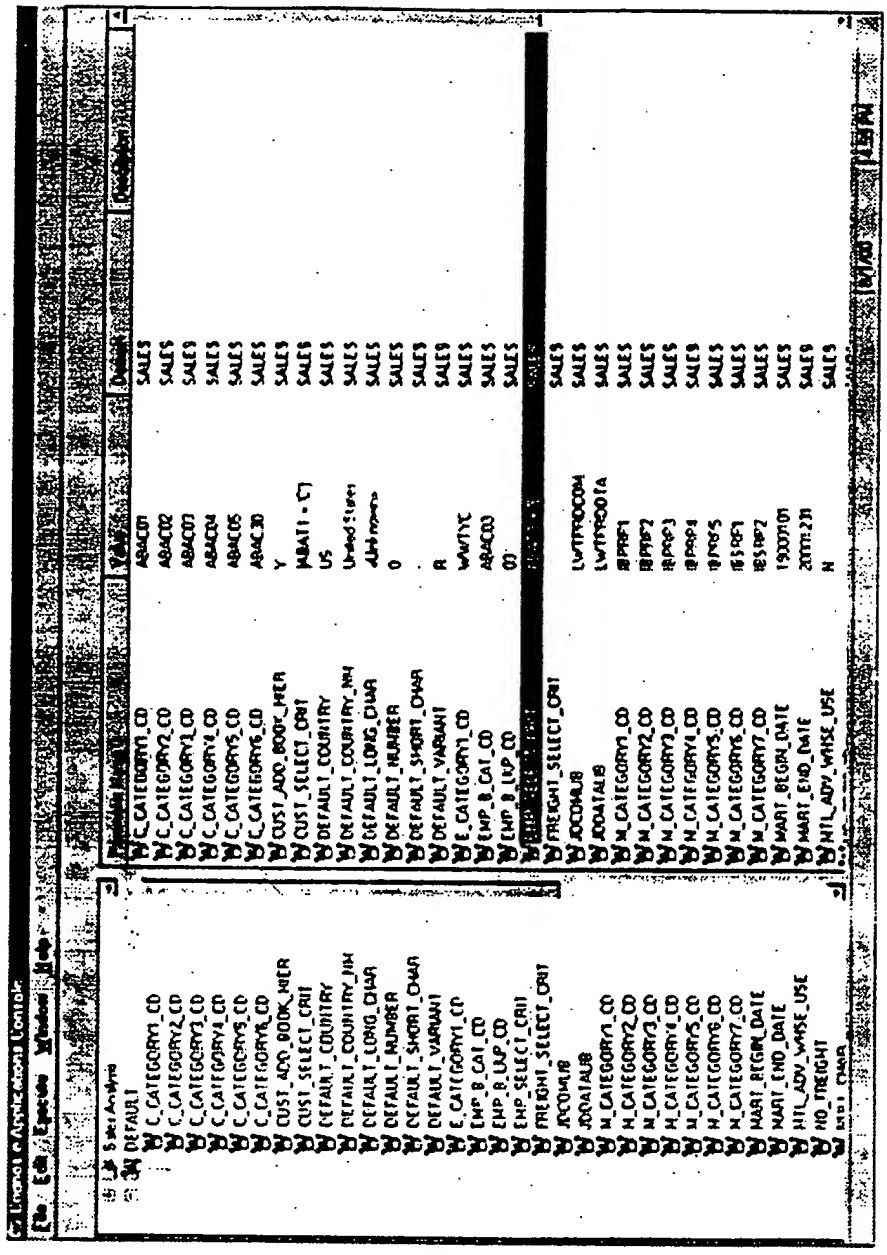


Figure 20

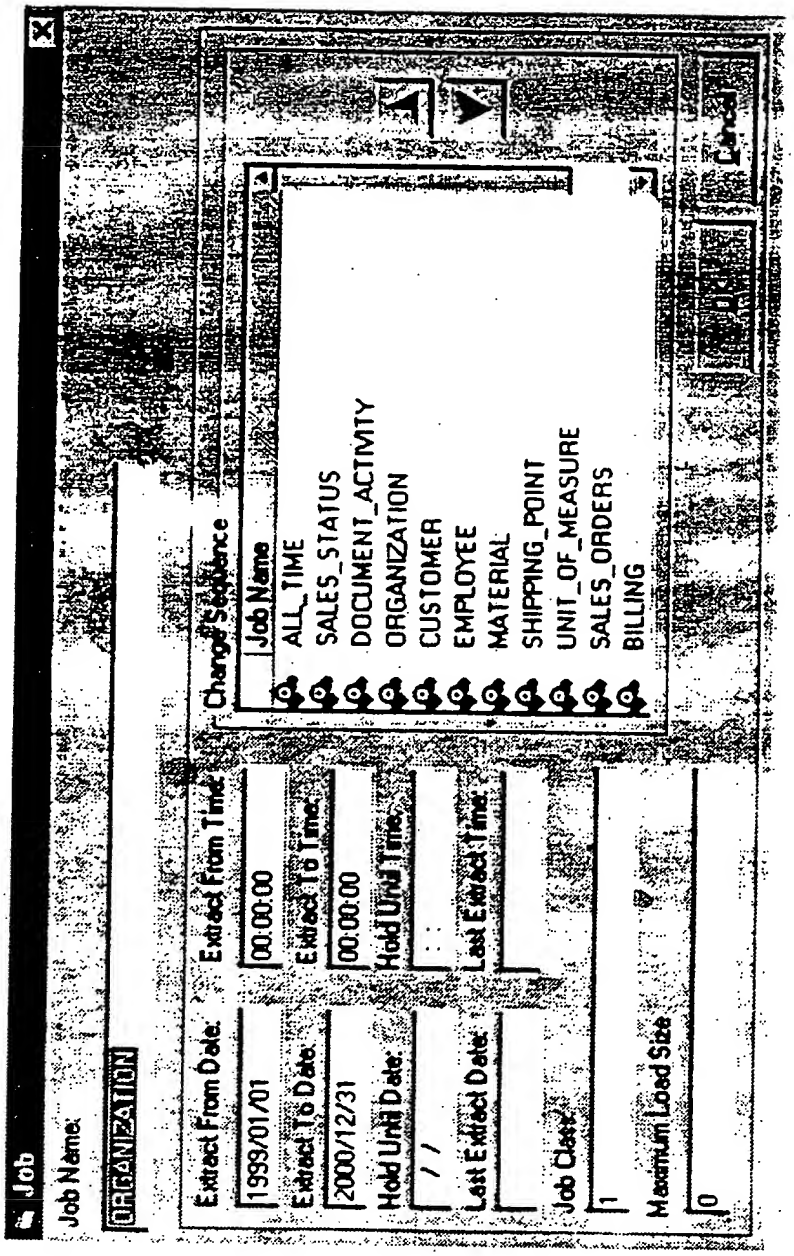
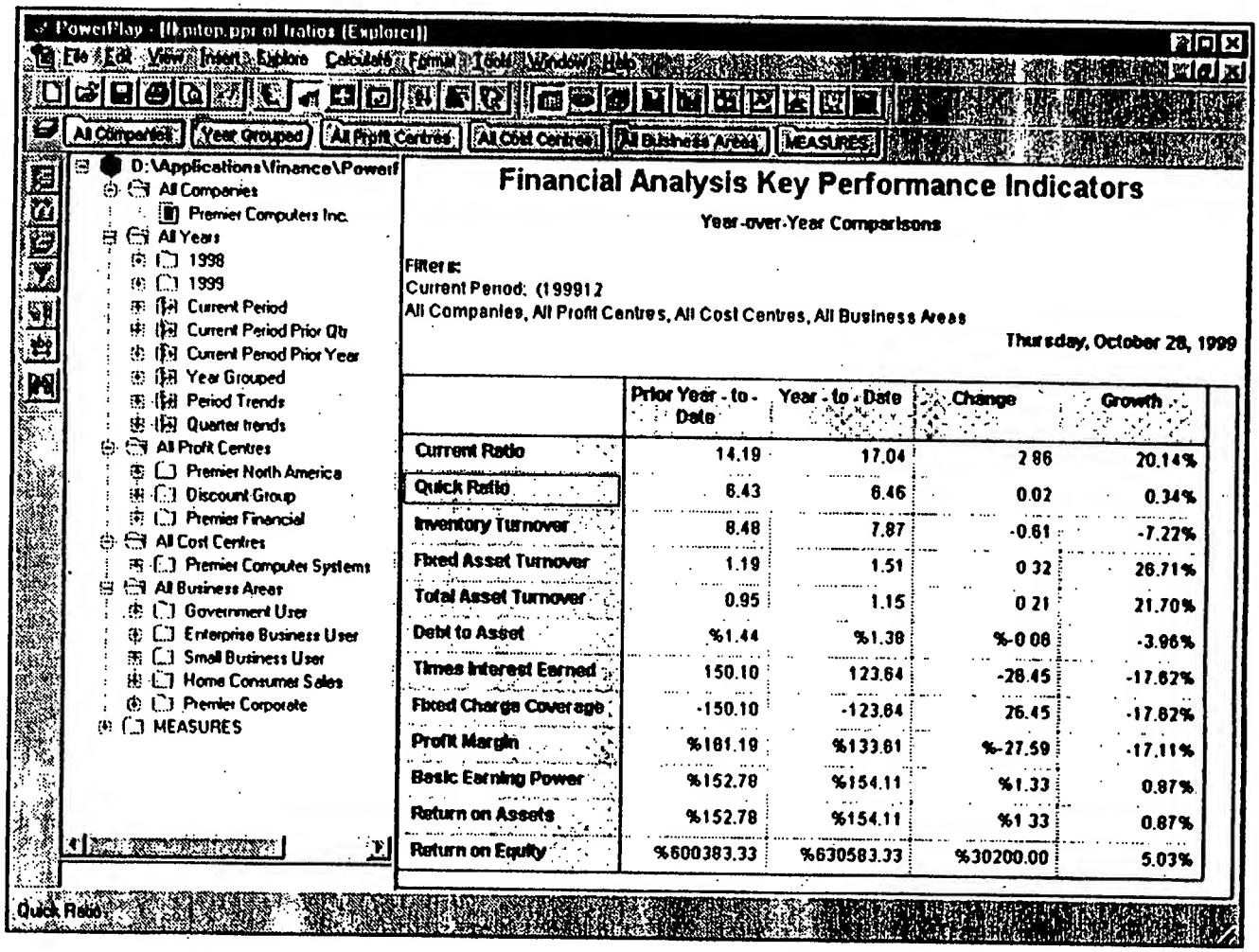

Job
Job Name:
ORGANIZATION
Extract From Date:
1999/01/01
Extract From Time:
00:00:00
Extract To Date:
2000/12/31
Extract To Time:
00:00:00
Hold Until Date:
/ /
Hold Until Time:
: :
Last Extract Date:
Last Extract Time:
Job Class:
1
Maximum Load Size:
0
Change Sequence
Job Name
ALL_TIME
SALES_STATUS
DOCUMENT_ACTIVITY
ORGANIZATION
CUSTOMER
EMPLOYEE
MATERIAL
SHIPPING_POINT
UNIT_OF_MEASURE
SALES_ORDERS
BILLING
Cancel

Figure 21

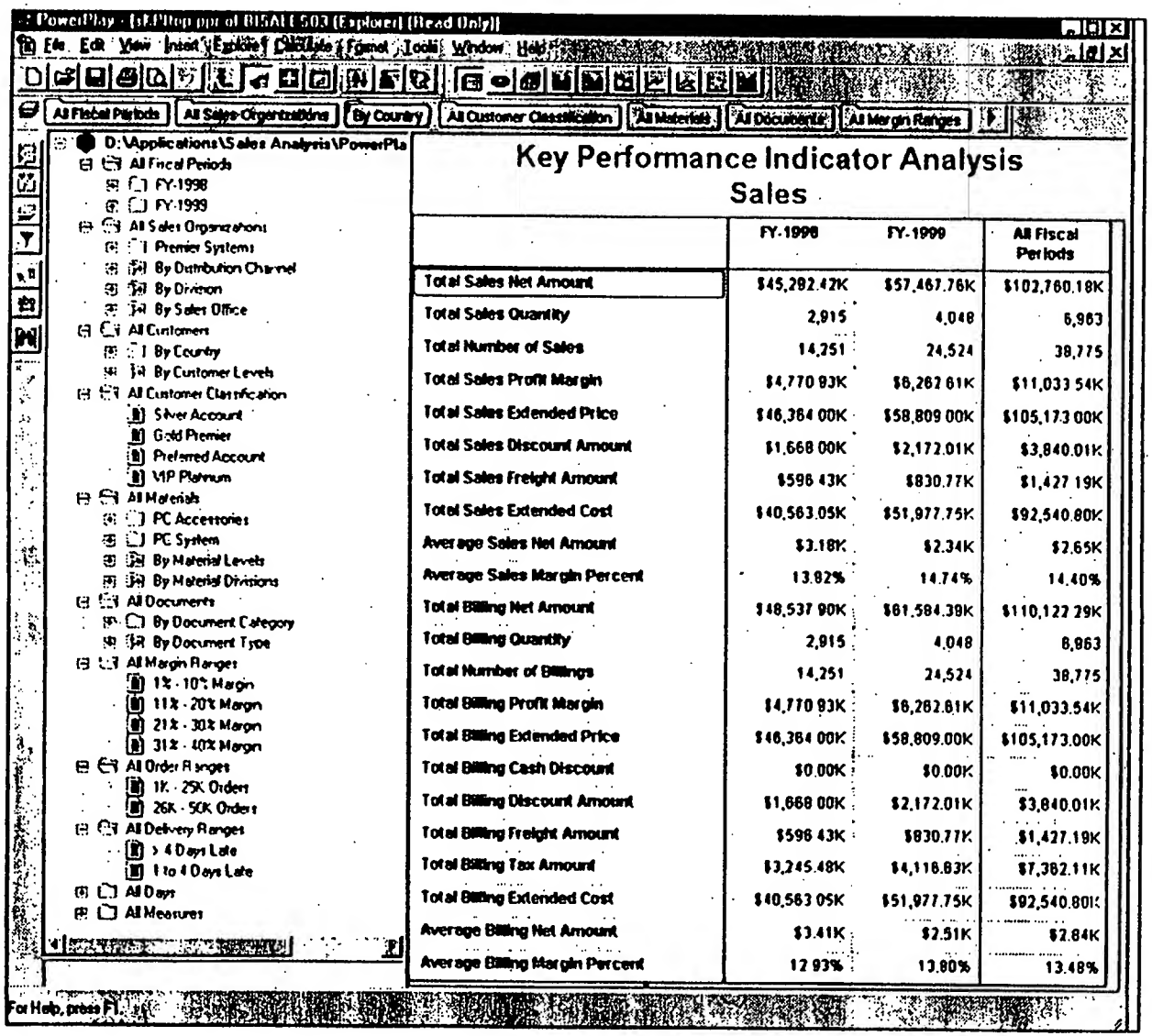


	Prior Year - to - Date	Year - to - Date	Change	Growth
Current Ratio	14.19	17.04	2 86	20.14%
Quick Ratio	6.43	6.46	0.02	0.34%
Inventory Turnover	8.48	7.87	-0.61	-7.22%
Fixed Asset Turnover	1.19	1.51	0 32	26.71%
Total Asset Turnover	0.95	1.15	0 21	21.70%
Debt to Asset	%1.44	%1.38	%-0 06	-3.96%
Times Interest Earned	150.10	123.64	-26.45	-17.62%
Fixed Charge Coverage	-150.10	-123.64	26.45	-17.62%
Profit Margin	%161.19	%133.61	%-27.59	-17.11%
Basic Earning Power	%152.78	%154.11	%1.33	0.87%
Return on Assets	%152.78	%154.11	%1 33	0.87%
Return on Equity	%600383.33	%630583.33	%30200.00	5.03%

Figure 22

Inventory Analysis Key Performance Indicators
Filters:
All Materials, 1999 Q 4, All Locations
Monday, February 28, 2000
1999Oct
1999Nov
1999Dec
1999 Q 4
Open Stock Value
Close Stock Value
Avg Stock Value
Mavg Stock Value
Usage Quantity
Usage Value
Cumulative Usage Quantity
Cumulative Usage Value
Moving Average Usage Quantity
Moving Average Usage Value
Inventory Turns
Coverage
Materials Count
Plant Count

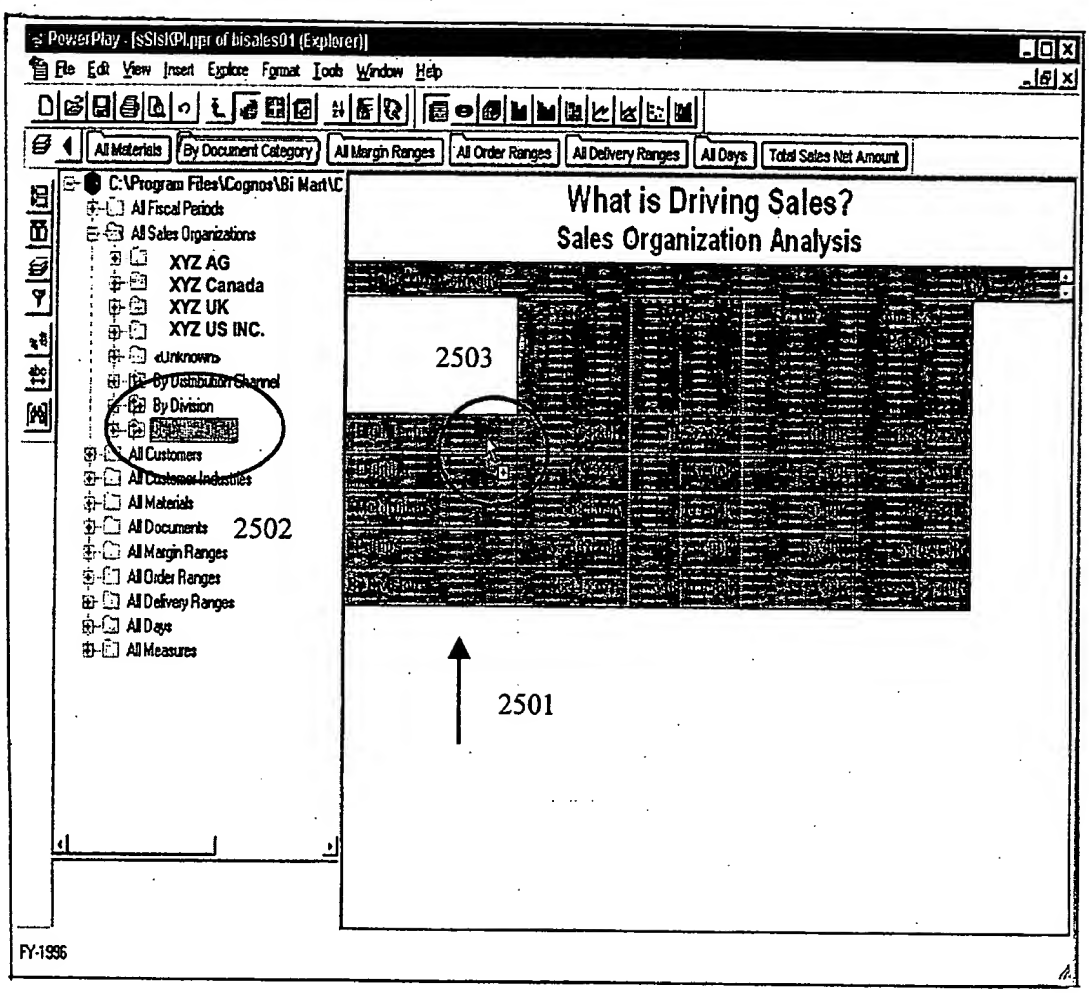
Figure 23



Key Performance Indicator Analysis
Sales

	FY-1998	FY-1999	All Fiscal Periods
Total Sales Net Amount	$45,292.42K	$57,467.76K	$102,760.18K
Total Sales Quantity	2,915	4,048	6,963
Total Number of Sales	14,251	24,524	38,775
Total Sales Profit Margin	$4,770.93K	$6,262.61K	$11,033.54K
Total Sales Extended Price	$46,364.00K	$58,809.00K	$105,173.00K
Total Sales Discount Amount	$1,668.00K	$2,172.01K	$3,840.01K
Total Sales Freight Amount	$596.43K	$830.77K	$1,427.19K
Total Sales Extended Cost	$40,563.05K	$51,977.75K	$92,540.80K
Average Sales Net Amount	$3.18K	$2.34K	$2.65K
Average Sales Margin Percent	13.82%	14.74%	14.40%
Total Billing Net Amount	$48,537.90K	$61,584.39K	$110,122.29K
Total Billing Quantity	2,915	4,048	6,963
Total Number of Billings	14,251	24,524	38,775
Total Billing Profit Margin	$4,770.93K	$6,262.61K	$11,033.54K
Total Billing Extended Price	$46,364.00K	$58,809.00K	$105,173.00K
Total Billing Cash Discount	$0.00K	$0.00K	$0.00K
Total Billing Discount Amount	$1,668.00K	$2,172.01K	$3,840.01K
Total Billing Freight Amount	$596.43K	$830.77K	$1,427.19K
Total Billing Tax Amount	$3,245.48K	$4,116.83K	$7,362.11K
Total Billing Extended Cost	$40,563.05K	$51,977.75K	$92,540.80K
Average Billing Net Amount	$3.41K	$2.51K	$2.84K
Average Billing Margin Percent	12.93%	13.80%	13.48%

Figure 24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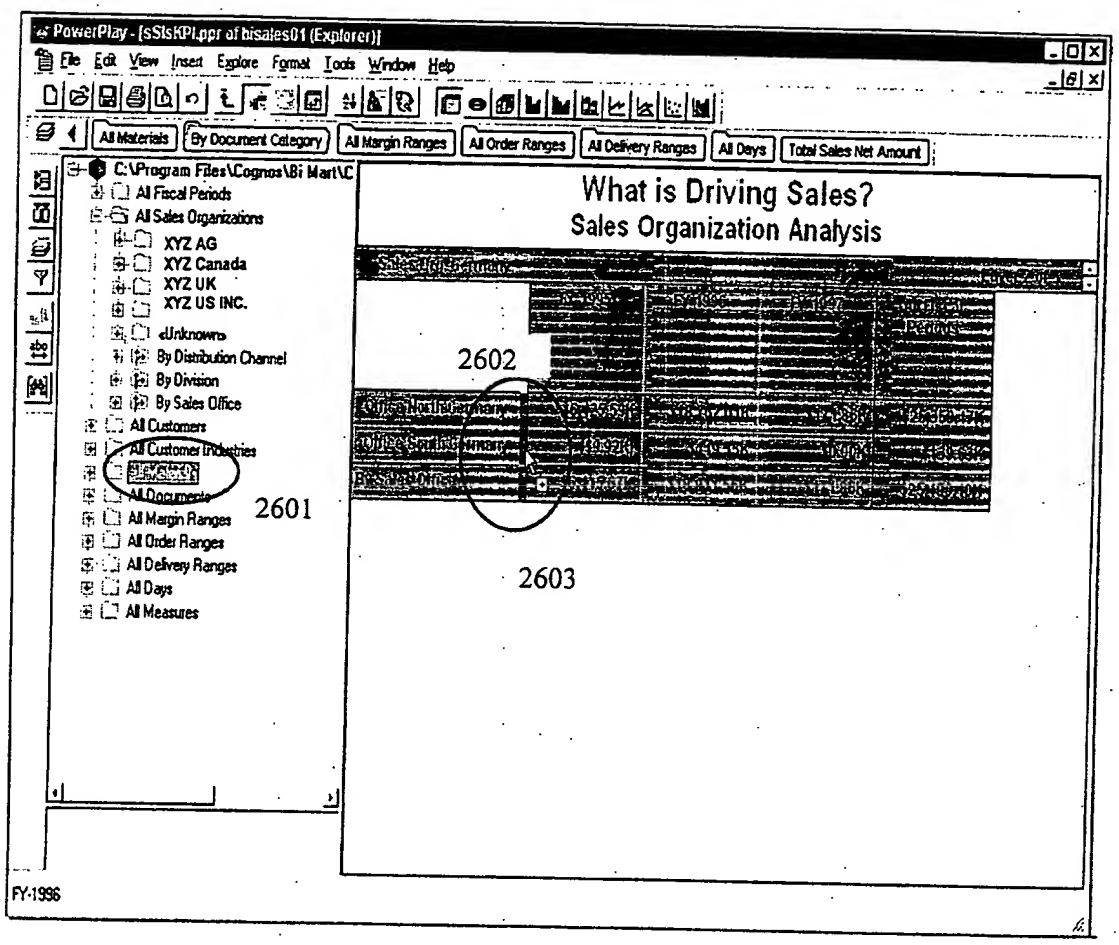
File Edit View Insert Explore Format Tools Window Help
All Materials
By Document Category
All Margin Ranges
All Order Ranges
All Delivery Ranges
All Days
Total Sales Net Amount
C:\Program Files\Cognos\Bi Mart\C
All Fiscal Periods
All Sales Organizations
XYZ AG
XYZ Canada
XYZ UK
XYZ US INC.
<Unknown>
By Distribution Channel
By Division
All Customers
All Customer Industries
All Materials
All Documents
All Margin Ranges
All Order Ranges
All Delivery Ranges
All Days
All Measures
2502
What is Driving Sales?
Sales Organization Analysis
2503
2501
FY-1996

Figure 25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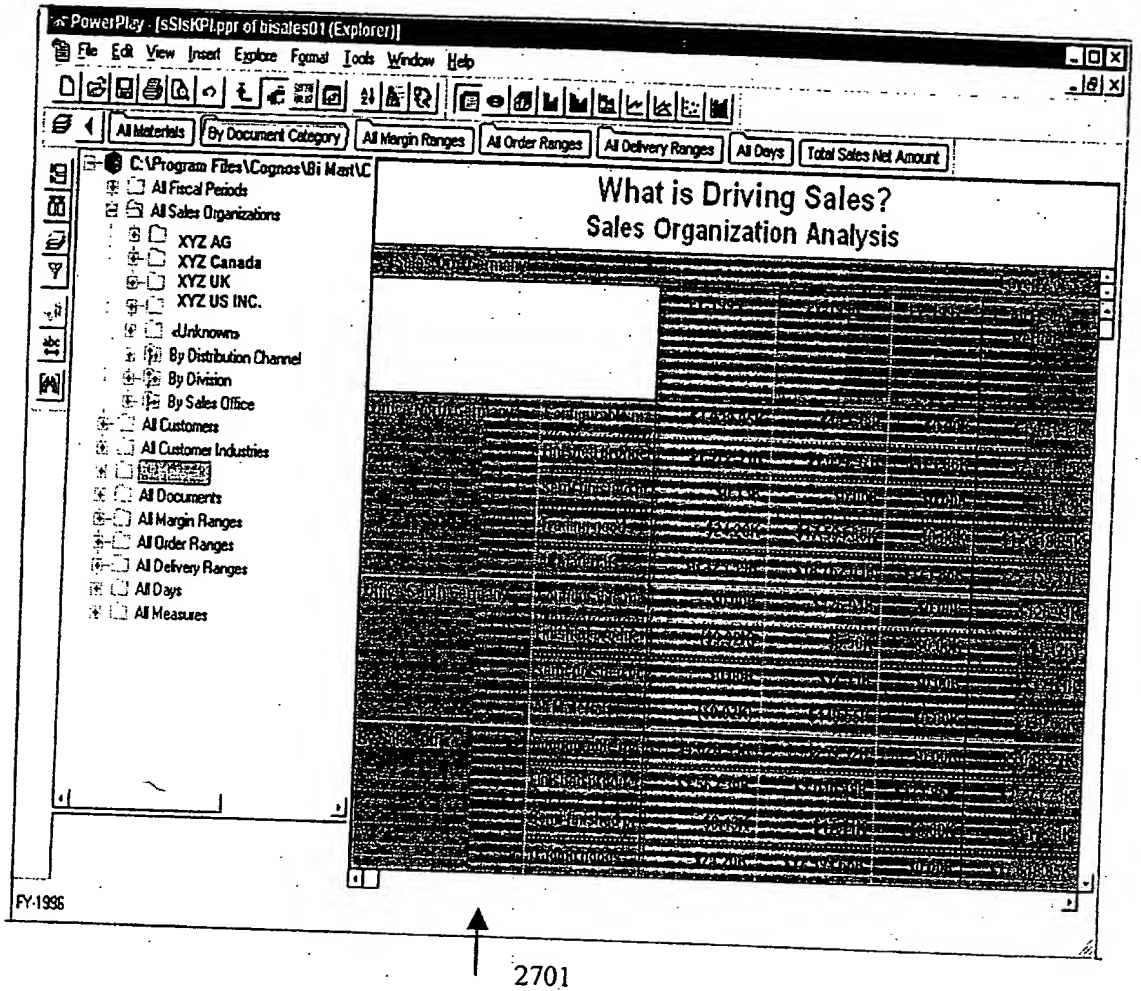
File Edit View Insert Explore Format Tools Window Help
All Materials
By Document Category
All Margin Ranges
All Order Ranges
All Delivery Ranges
All Days
Total Sales Net Amount
C:\Program Files\Cognos\Bi Mart\C
All Fiscal Periods
All Sales Organizations
XYZ AG
XYZ Canada
XYZ UK
XYZ US INC.
<Unknown>
By Distribution Channel
By Division
By Sales Office
All Customers
All Customer Industries
All Documents
All Margin Ranges
All Order Ranges
All Delivery Ranges
All Days
All Measures
2601
What is Driving Sales?
Sales Organization Analysis
2602
2603
FY-1996

Figure 26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All Materials
By Document Category
All Margin Ranges
All Order Ranges
All Delivery Ranges
All Days
Total Sales Net Amount
C:\Program Files\Cognos\Bi Mart\C
All Fiscal Periods
All Sales Organizations
XYZ AG
XYZ Canada
XYZ UK
XYZ US INC.
Unknown
By Distribution Channel
By Division
By Sales Office
All Customers
All Customer Industries
All Documents
All Margin Ranges
All Order Ranges
All Delivery Ranges
All Days
All Measures
What is Driving Sales?
Sales Organization Analysis
FY-1996
2701

Figure 27